The Reader Writes:—

A Plea for Toleration

You are right in your editorial, "Wanted More Good Spokesmen," in the contention that the so-called public addresses of most of our chemists and executives are pretty dismal affairs, and you do another good service to us all by coming out and saying that chemistry and the chemical industry need more effective ambassadors of good will. However, are you not a bit too harsh on those who are willing to stand up and talk without having been blessed with those rare, natural gifts which are necessary to a really first-class orator? More sympathy with their well-intended efforts and a little less scorn at the results they achieve would seem to have been not only more politic, but also more fair.

Baltimore — WM. WALLACE WHITE.

Times Have Changed

Your editorial on Regimented Research recalls a phrase uttered by a German leader not so very long ago. He stated that all research from now on must be on a national Germanic basis.

When I was in the University we heard a great deal about the wonderful opportunities for research provided by the German system. Apparently those good old days are gone.

Washington, D. C. — M. H. HAERTEL.

Double Value

I always enjoy CHEMICAL INDUSTRIES, but your last issue has given me two extra joys. Number One—the "Chemical Buyer's Guidebook Section" is a real improvement both in form and in its information. This has certainly become invaluable to anyone who buys or sells chemical products. Number Two—the editorial about German research, cut out and carried in my pocket and shown to my technical friends who are varying shades of pink, makes some of them think that maybe after all the American way isn't so bad. It is written in language they understand and they are stumped to answer it. More of the same kind, for there are too many half hearted communists in our midst.

Chicago — CHARLES G. PLUMMER.

Not "Chem. and Met. Industries"

We find CHEMICAL INDUSTRIES one of the best and most valued of all American publications that we subscribe for. Couldn't you enlarge it by taking on metals and ores too?

Vienna, Austria — OSKAR HOROWITZ.

The "Bookworm" Turns

Dear "We"—Well, well, I'm real sorry I have miscalled the finest and most interesting chemical journal published in or on Tellus. I am nigh eighty and peradventure this is a spot of senile boobery cropping up. I will be good in the future and remember your name is *Chemical Industries* not *Chemical News*—though you do give a reader more live news of the chemical industries than any publication I know. So forgive me, for I intend to take bits of your frank humor as texts for further cracks—wise or otherwise.

Harrow Weald, Middlesex, England — ARTHUR MORRIS.
"Bookworm" of *Paper Industry*.

Ballyhoo and Propaganda Are Not Synonyms

Would the dedication of the new Mellon Institute building be the proper occasion for a big ballyhoo about the great service of chemistry to mankind—rendered, by the way, at handsome profits to our chemical manufacturers? I'm asking you. My own answer is that I am fed up with all the soft soap about the glories of research and the gifts (sic) of chemistry to the American people. Is this a business? Or isn't it?

New York City — J. S. FISHER.

What Goes on the Back?

If you are going to continue "Names of the Month" (current issue, p.469) please put the material on a page that can be cut out without spoiling a good article on the back.

Ann Arbor, Mich. — B. A. SOULE,
University of Michigan.

News from the "Labor Front"

You deserve to know, I think, that there is one of your readers who very much appreciates the splendid résumé of the chemical news that CHEMICAL INDUSTRIES gives us every month. I am sure there are many others, who are not in a position to be in close touch with daily developments, who feel as I do. The news of men in new positions and of new construction work undertaken by chemical corporations is of real practical value to me, and I marvel at the number of such items which you are able to collect and print in such a few number of pages. Of late I have naturally been much interested in the "labor" news you have been publishing and want to thank you for keeping me posted on a subject of real interest which it is all but impossible to get any facts about.

Cleveland, Ohio — H. H. SHOLES.

We are Asking Permission to Reprint

Your readers' attention might very well be called to an extremely sane exposition of the intricate problems of national defense and munitions-making which was set forth by Major L. A. Codd, the editor of *Army Ordnance*, in a Brackett lecture delivered at Princeton University. Pre-eminently an expert on this subject, he expounded it without the expert's usual narrowness of viewpoint and with a wealth of interesting, pertinent, historical facts to support a courageous and definite conclusion which he did not hesitate to state plainly.

Only one, who ostrich-like buries his head in the sand, can escape the conviction that the world today faces a serious war problem and that the United States cannot escape by evasion the consequences of a world conflict. It is wholly superfluous for me to emphasize to you the close connection between the chemical industry and many ramifications of this problem. Major Codd's address is indeed an important contribution to constructive thoughts on munitions which deserves a wide publicity in chemical circles.

Princeton, New Jersey — B. K. SCOTT.

"Thanks for the Ad"

I assure you no advertising is intended with the reprints of your June News Section cover; but my daughter decided that each of the girls photographed should have a reprint of said photograph, hence the reason of my request. I have had letters and all kinds of communications about this full page "advertisement" you gave me.

Midland, Mich. — WILLIAM J. HALE.

— All along the line

Today almost every industrial enterprise uses chemicals in one form or another. Many are gradually revolutionizing their methods through the application of specially developed materials and processes.

Recognizing the responsibility that such an important trend places upon the chemical manufacturer, Cyanamid is working behind the scenes in many fields to augment and improve the theory and practice of their application. In our laboratories men are applying advanced knowledge and technique to customers' problems. Frequently their efforts produce a material that speeds up a step in the textile industry . . . or improves the quality of a product in the soap, leather, metal, or other industries. While research is sometimes slow, it is nonetheless sure . . . and it is continually helping many manufacturers lighten the burden of their work and swing heavier production loads with less effort.

In the column on the right are listed a few Cyanamid products which are increasing efficiency in the industries where they are used. We are proud to add these contributions to a long series which, in no small measure, are bringing about better results in industrial methods.

AMERICAN CYANAMID & CHEMICAL CORPORATION

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

COPPER RESINATE—Manila rope, when kept under sea water for 10½ months, retains only about 13 per cent of its original strength. If treated correctly, however, over 70 per cent of its strength can be retained. One highly effective agent for this purpose is a 10 per cent solution of COPPER RESINATE in creosote oil.

ALWAX SIZES for surface sizing for improved finish, water resistance, made in high and low melting point waxes. These emulsions may be applied in dilute suspensions to the surface of the board, and will lay fuzz and improve the "scuff" test. They are compatible with starches and may be added to starch for tub sizing or calender sizing with interesting results.

NITROCELLULOSE for lacquers to meet the present-day high quality finishing requirements of textiles, paper, automobiles, furniture, radios and polished metal. Readily soluble and free from deleterious impurities. Available in all standard viscosities.

REZYL* 330-5 is a new alkyd resin of unusual through drying properties. It is suggested especially for low bake white enamels, as well as for air drying enamels and lacquers. It sets up rapidly and is, therefore, suitable for spray application. Its exceptional degree of through hardening is secured without modification with phenolic or natural resins, thus assuring good color retention and outdoor durability. REZYL 330-5 imparts good gloss, water resistance and toughness. Supplied for your convenience as a 50% solution in xylol.

SODIUM SULPHATE—*Crystal* (Glauber's Salt). Manufactured and warehoused at a number of strategic points. Our brand has been the standard for many industries. It is clean, dry, a neutral crystal, free from excess moisture and impurities. Packed in bags containing 200 lbs. and in barrels containing 350 lbs.

Anhydrous—A very pure product for use, among others, in the textile industry, pharmaceutical industry, for boiler water treatment, and for standardizing dyestuffs. Packed in bags containing 200 to 220 lbs. and in barrels containing 450 to 550 lbs.

Watch this column monthly for the announcement of other interesting Cyanamid developments. Technical information on these and other Cyanamid products is available on request.

*Trade Mark of Rezyl Corporation
Protected by U. S. Patents

CHEMICAL INDUSTRIES

The Chemical Business Magazine

WHILE the C. I. O. wave is not receding, nevertheless it has run into shoal water and been checked by the breakwater of public opinion. No substantial advance has been made within the chemical group during the past month, and definite set-backs have been suffered in the steel and motor industries. Many who sixty days ago thought that any effective opposition to the Lewis organization was hopeless, now feel that the chances are distinctly against the successful enrollment of all American labor in a single organization.

For it has been clearly demonstrated that not only has the C. I. O. failed to win a substantial number of workers, but it has even antagonized a great number of average citizens. Public sentiment, always important in labor disputes, has been given tremendous weight by the political aspects of the C. I. O. The Lewis-Roosevelt alliance made that movement a new and significant thing in this country, since through it American Government forsook its traditionally neutral position for one of active labor partisanship. If, however, that alliance becomes a political liability the forthcoming results may be even greater in negative form than they might have been in a convincing C. I. O. victory. To have kept the labor issue out of American politics would certainly be no mean accomplishment.

The check to the C. I. O. drive must not be interpreted, however, as a defeat to the labor movement. It is a protest from labor and the public against racketeering regimentation backed by political support. Out of it is apt to come a more responsible labor leadership and a clearer definition not only of the rights, but also of the duties of unions. Thus the compulsion to deal collectively would become an obligation which industry should welcome, not oppose.

The Forty Hour Chemical Week

International agreement to limit the hours of labor in the world's chemical industries to forty a week is comparatively simple in theory. As the original agenda of the conference now in session at Geneva has pointed out, in chemical manufacture labor costs are not a major item; many important processes are already thoroughly internationalized; and numerous chemical cartels now exist for the purpose of standardizing commercial practice. Actually, however, the convention is not making rapid headway and will in all likelihood accomplish nothing.

Objections, which are most ably presented by the delegates of the British manufacturers, are first, that it is impossible so to define the chemical industry that it can be considered an international unit, and second, that any consideration of hours must, in fairness, include wages and working conditions. The verbatim report of the preliminary conference held last winter (copies of which have just reached America) indicates the seriousness of these obstacles to any agreeable, definite conclusion.

In that published report we are naturally interested in the point of view of the representative of the United States, Theodor J. Kreps, Professor of Economics at Stanford, who as author of an exhaustive study of the world's potash industries is better acquainted with chemical problems than is the average professional economist. His potash studies have doubtless led him distinctly to overemphasize the importance of cartels as an argument in favor of similar international agreements on working hours; but it is less easy to discover the experience upon which he based the following statement:

> There are a number of branches of the chemical industry in which prices are determined in a free market. In these branches employment maintained itself. On the other hand, in a very large number of branches of the industry prices are stabilized or administered. How, under such conditions, can there be transmitted to the consumer the benefit of recent chemical advance, except by increasing consumer incomes either by raising wages or by shortening hours?

The Measure of Chemical Progress

We all too easily share Professor Kreps' forgetfulness that it is the consumer who is the legitimate beneficiary of all production. Thus viewed increased output and lower selling price are infinitely more important to economic progress than either shorter hours or higher wages.

Chemical science can be proud of its manifold contributions to mankind's convenience and comfort, safety and good health; and chemical industry certainly need not be ashamed that while earning better-than-average dividends it has paid better-than-average wages. Nevertheless it is in alliance that these two have "transmitted to the consumer the benefit of recent chemical advance" in the most substantial and practical way.

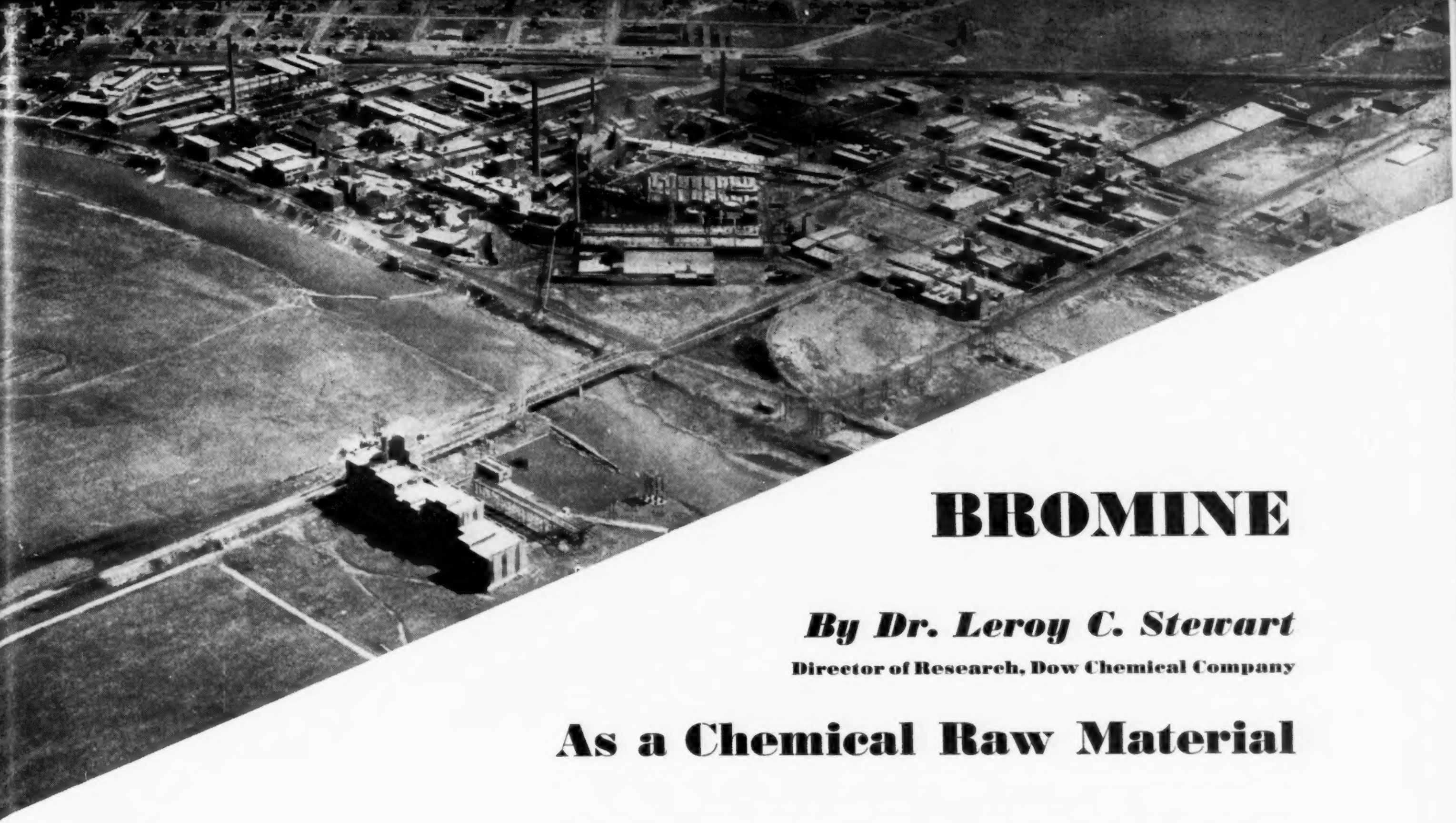
The recently published "Dye Census" of the Tariff Commission is literally packed with illustrations of this type of chemical progress. One of the most apt is the 1936 production of 31,244,378 pounds of phthalic anhydride sold at 12c a pound. Exactly twenty years ago, the first U. S. output was 138,000 pounds sold at $4.23 a pound. That is true chemical progress, and while coal-tar products have been leaders in this line, still they do not monopolize it. A decade ago we produced from imported natural raw materials 3 million pounds of citric acid which was sold at $1.25 a pound. Thanks to a new chemical process we are producing this material from domestic materials at the rate of over 15 million pounds and selling it for 24c. Both of these astounding records of increased output at lower price have been made by chemicals which in Professor Kreps' meaning are "administered," for phthalic anhydride and citric acid are produced by processes carefully protected by patent rights.

Here is the "philosophy of create," as contrasted with the "philosophy of grab," translated into deeds and dollars. It is just what Karl Compton meant when he described "a way of securing a more abundant life which does not simply consist in taking it away from someone else."

A Guest Editorial

Sir Ernest Benn, of *The Chemical Age*, is a contemporary we greatly admire—a vigorous, public-spirited, outspoken, successful publisher of industrial papers. In a public address he recently said:

> The time is ripe for a revolt against the notion that the vote can take the place of work and value. In such a revolt the business classes have rather a good story to tell. We are the people who made civilization, and we are the only people who can save it. We contribute 1,000 millions a year in taxes for all the madness of politics. We submit to every sort of interference and are out of the picture. If something wants doing, a committee is formed of politicians and bureaucrats to decide how it is to be done. It is never thought wise to leave it to business forces to do the job better, quicker and cheaper. Life is a joke, a tragic joke, so long as we allow the politician and bureaucrat to remain on top. Only when the business classes once more assert themselves will life in general become once more happy and contented and useful.



BROMINE

As a Chemical Raw Material

By Dr. Leroy C. Stewart

Director of Research, Dow Chemical Company

OF all the elements, bromine shares the distinction only with mercury, of being a liquid at ordinary temperatures. When it was discovered in 1826 by Balard who prepared it from salts in Mediterranean sea water, he thought first that he had a chloride of iodine, but soon recognized that he had obtained an element. His original name for it was "muridine" but afterwards he called it bromine, taken from the Greek "bromos," meaning a stench.

Bromine is not found in nature in the uncombined state but occurs chiefly as magnesium bromide, either in sea water or in what is probably the residue of prehistoric sea water, namely, natural subterranean brines, and crystalline saline deposits of certain localities. The chief commercial sources of bromine, in the order in which they have been developed, are as follows:

(a) Natural brines, particularly in Michigan, Ohio, and West Virginia.
(b) Carnallite deposits of Stassfurt, Germany.
(c) Bitterns from sea water solar-evaporation in California.
(d) The Dead Sea.
(e) Sea water at Wilmington, North Carolina.

Natural brines were first used as a source of bromine at Freeport, Pennsylvania, in 1846. This effort probably led to the granting of U. S. Pat. 12077 in 1854 to Amalie Stieren of Natrona, Pennsylvania, for an "improved process of treating the mother water of salines to obtain useful products." Interest in commercial production also was developed in Freeport, Pennsylvania, where in 1849 Dr. David Alter began recovering limited quantities at the local salt works. In the vicinities of Hartford and Mason, West Virginia, and Pomeroy, Ohio, small scale recovery of bromine from natural brines took place between 1870 and 1875. Some bromine is still produced at these last three places and also at Malden, West Virginia by J. Q. Dickinson & Company, and at South Charleston, in the same state, by Westvaco Chlorine Products Company.

In 1885 recovery of bromine from brines was commenced in the area of Midland, Michigan, which shortly afterward received the attention of Herbert H. Dow still a student at Case School of Applied Science. After graduation in 1888 he patented an extracting method which he developed for bromine from brines, and in 1890 organized the Midland Chemical Company to operate his improved process. In 1897 the company which bears his name, The Dow Chemical Company of Midland, Michigan, was organized and today, with an output of more than 10,000,000 pounds in 1936, it is the largest producer of bromine in the United States.

In 1929 Ruggles and Rademaker (Rademaker Chemical Company) began producing bromine from brine at Manistee, Michigan, and in 1932 The Texaco Salt Products produced from a similar source near Tulsa, Oklahoma. The latter operation has since been discontinued.

The Stassfurt deposits of carnallite, $KCl.MgCl_2.6H_2O$, and other minerals such as kainite, $MgSO_4.KCl.3H_2O$, and sylvite, KCl, were operated first for potassium salts, but bromine, magnesium chloride and magnesium sulfate soon became valuable by-products. The crude carnallite contains from 0.15 to 0.25 per cent. bromine, present probably as a brom-carnallite, $KBr.MgBr_2.6H_2O$. In recovering potassium chloride from the deposits magnesium bromide accumulates, together with the magnesium chloride, in a strong mother liquor containing the equivalent of about 6 per cent. bromine, which is then recovered in a separate process. Manufacture from this source in Germany was commenced in 1865 with a capacity of about 2,500 pounds in that

year. There are now about a dozen plants in operation. The total output of these plants is not known, but it is safe to say that much more bromine goes to waste than is produced.

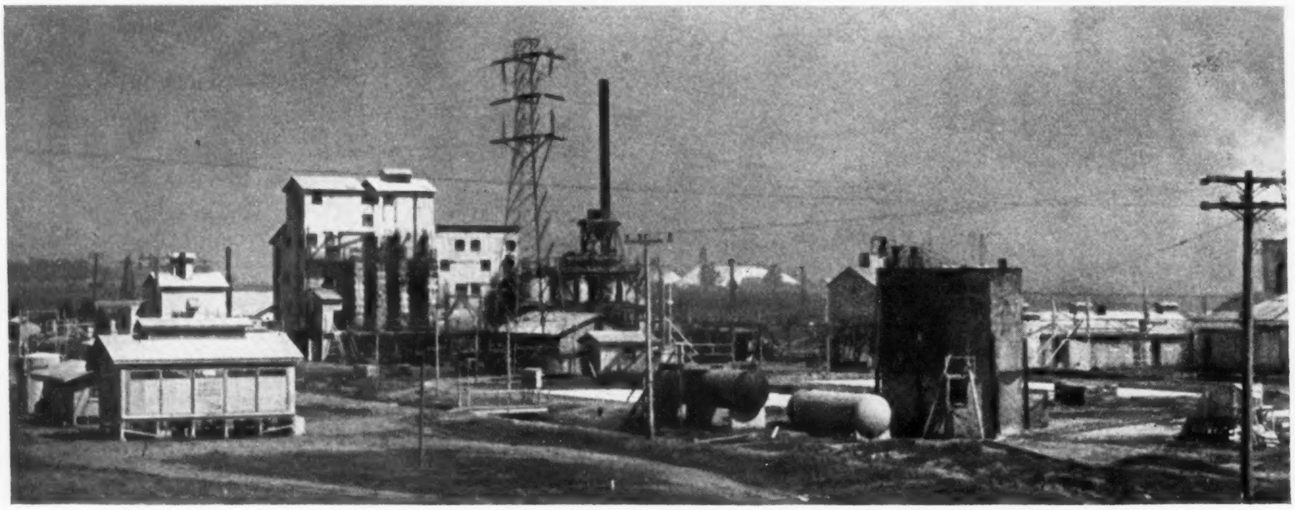
The third main source of bromine to be employed is the bitterns resulting from solar evaporation of sea water in California. Several producers of common salt use this method, and at San Diego Bay and San Francisco Bay the strong mother liquors resulting are sold to the California Chemical Corporation as raw material for producing bromine as well as magnesium compounds. These operations, commenced in 1926, are now producing more than a million pounds of bromine per year.

Early in 1931 the first plant for production of bromine from waters of the Dead Sea was put into operation by the Palestine Potash Company, Ltd. The raw material is pumped from a depth of about 175 feet, since the bromine content at that point is approximately 4800 parts per million, or about 50 per cent. greater concentration than at the surface. The original capacity was approximately one ton per day. Since then it has been increased and in 1935 production amounted to about 800,000 pounds.

A few other foreign sources of bromine are of interest. For example, in Italy, the Societa Italiana del Broma recovers from heavy brines obtained by concentrating water from a large salt lake. In 1930 this plant was reported to have had an output of about 100,000 pounds per year. Since that time imports of bromine and bromides into Italy have decreased about 90 per cent. This would indicate that production is now almost sufficient for the needs of that country. In the Crimea is a plant which in the same year is said to have had a production of about 60,000 pounds, using concentrates from Saksky Lake. During the World War, France obtained bromine from an inland basin in Tunis at Sabkha el Melah. Ocean water drains into this basin during certain windy seasons and evaporates during the period of the year when highest temperatures prevail, thus producing a strong salt solution containing 0.21 per cent. bromine. When the war ended, this plant was closed down in favor of a source of both magnesium chloride and bromine located in Alsace. The exports of bromine from France in 1935 amounted to about 430,000 pounds, most of which went to Switzerland. The bromides exported for the same year amounted to about 675,000 pounds, and these were taken mostly by the Netherlands, Russia, Belgium, and Switzerland.

Most recent source of bromine is raw sea water. The Ethyl Gasoline Corporation developed a scheme which they operated in a small-scale plant in 1924, in which sea water was acidified and chlorinated, followed by the addition of aniline. The latter reacted with the bromine, which was liberated in the sea water by the chlorine, to form flocculent tribromoaniline. This was filtered from solution, dried and added to gasoline along with tetraethyl lead in the production of anti-knock motor fuel. This process was also operated on board a boat, the *S. S. Ethyl*, a short time later in order to determine if water a number of miles out from shore might give a better yield of the desired product.

About the same time The Dow Chemical Company was actively interested in recovering bromine from sea water, using a process somewhat similar to that used on natural brines at their plant at Midland, Michigan, although the bromine content of sea water is only 67 parts per million as compared with 1300 parts per million for the Michigan brine. A satisfactory process was developed, working first on synthetic sea water and then on ocean water shipped in tank cars to the plant. In 1931 a pilot plant was operated in the vicinity of Wilmington, North Carolina, and in 1933 the Ethyl Dow Chemical Company was formed to recover bromine from sea water on a commercial scale. Production was started in 1934, using the Dow process in a plant near the mouth of the Cape Fear River. Scheduled capacity was 5,000,000 pounds annually. This quantity was exceeded the first year and in 1936 there was produced at this plant about 8,000,000 pounds of bromine. All of this was made into ethylene dibromide, which was used by The Ethyl Gasoline Corpo-



Bromine plant of the California Chemical Company at Newark, California.

ration in the preparation of anti-knock gasoline. At present writing the capacity of this plant is being doubled.

Production of bromine from all sources depends essentially on freeing it from the combined state by the use of its sister halogen, chlorine. When gaseous chlorine is brought in contact with a solution containing a salt of bromine, the chlorine substitutes itself for the bromine in the salt, thus producing a solution of free bromine. The latter is then recovered either by blowing it out with air or by boiling it out with steam. After removing bromine from dilute solution by air, as in the case of the sea water process, the gaseous mixture is passed in contact with a water solution of an alkali such as soda ash, to form a strong solution of bromide and bromate. This is subsequently treated with sulfuric acid to liberate the bromine, which is then steamed out and condensed. When a brine or mother liquor is treated with chlorine, the resulting bromine, contaminated with some chlorine, is vaporized with steam and condensed, after which it may be fractionally distilled to remove the chlorine so as to give a purity of not less than 99.5 per cent. Most liquid bromine on the market is of a pure grade, but from time to time, small quantities containing from 4 to 8 per cent. chlorine are offered.

Because of the extremely corrosive nature of bromine, all equipment with which it comes in contact is made of glass, chemical stoneware, acid-proof brick and cement, or in some cases lead. Only a relatively small proportion of the bromine produced is shipped in the liquid form, when it is packaged in glass-stoppered or lead-capped bottles, six and one-half pounds to the bottle, and usually nine bottles to the case. The bottles of course must be very carefully protected, and the stoppers are sealed in place.

The use of bromine itself, except in the preparation of its compounds, is almost negligible. It has been proposed for disinfecting purposes, as in treatment of drinking water, in a manner similar to that in which chlorine is used. A few installations have been made for treatment of water on a fair size scale but its use has not been extended along this line. That it is more expensive than chlorine and must be shipped in glass containers has undoubtedly retarded its use for this purpose. Furthermore, it has not appeared to be as universally efficient as chlorine for a variety of types of water.

For a few uses where free bromine is desired, a handy way of preparing it *in situ* (avoiding the hazards and inconvenience of shipping it in glass) is to add acid to the dry mixture of 43 per cent. sodium bromate and 57 per cent. sodium bromide. This mixture may be shipped without extraordinary precautions and is sold as "mining salts." The name was acquired because of extensive use in mining operations in the bromcyanogen recovery of gold from telluride and other low quality ores. The mining salts, among other uses, are employed also as an efficient agent for the bromination of organic compounds.

Table I

Bromine (free and chemically combined) Produced in the United States, 1914-1935.*

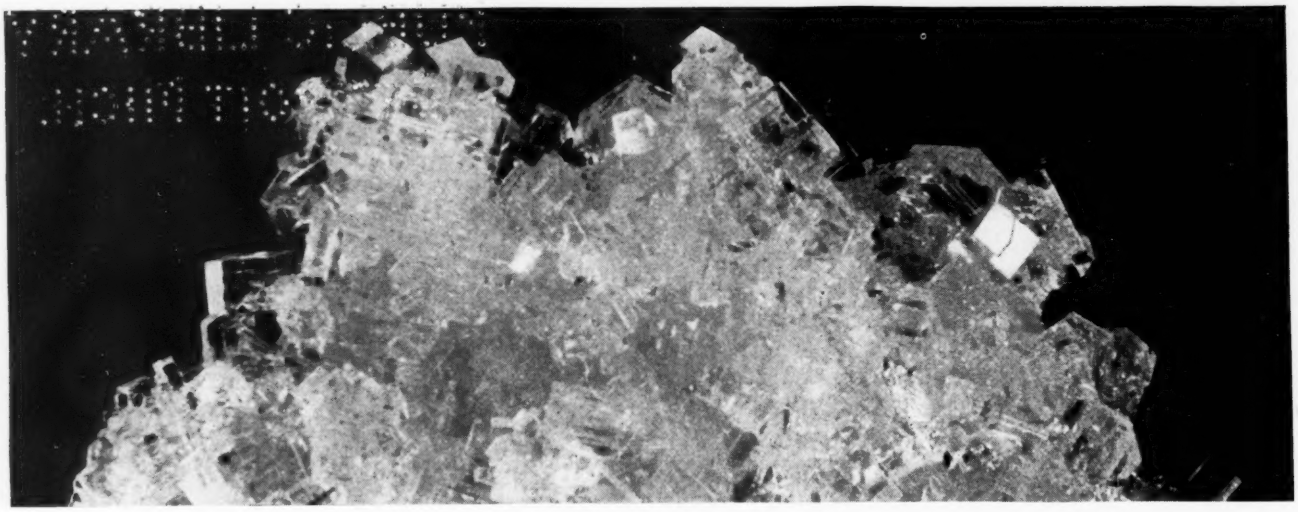
	Quantity in pounds	Value	Mfrs. Av. Selling Price per pound
1914	576,991	$ 203,094	$ .35
1915	855,857	856,307	1.00
1916	728,520	951,932	1.31
1917	895,499	492,703	.55
1918	1,727,156	970,099	.56
1919	1,854,971	1,234,969	.67
1920	1,160,584	745,381	.64
1921	711,953	172,759	.24
1922	1,005,174	150,668	.15
1923	842,352	146,176	.17
1924	2,033,804	594,685	.29
1925	1,566,120	488,406	.31
1926	1,245,760	426,837	.34
1927	1,756,310	564,689	.32
1928	2,164,000	649,475	.30
1929	6,414,620	1,759,325	.27
1930	8,462,800	2,109,974	.25
1931	8,935,330	1,854,650	.21
1932	5,727,561	1,182,569	.21
1933	10,147,960	2,040,352	.20
1934	15,344,290	3,227,425	.21
1935	16,428,533	3,483,239	.21

* Compiled from Mineral Resources, U. S. Department of Commerce, 1914-1931, and Minerals Year Book, U. S. Department of Interior, 1932-5.

Sodium bromide and sodium bromate are obtained when bromine is caused to react with alkaline sodium salts such as the carbonate or hydroxide, and are recovered from solution by crystallization. Since the demand for the bromide greatly exceeds that of the bromate, it is customary to reduce the excess bromate to the bromide, using iron filings for this purpose. Potassium bromide and bromate are prepared in a similar manner.

The most extensively used compound of bromine is ethylene dibromide. To make this, ethyl alcohol is vaporized and passed over heated kaolin, thus making ethylene gas. The latter is then reacted with liquid bromine to form ethylene dibromide. This is utilized in conjunction with tetraethyl lead in the treatment of gasoline motor fuel to improve its anti-knock properties. The presence of the bromine compound permits the formation of relatively volatile lead bromide during the combustion of the gasoline, and the metal is thus removed from the engine, along with the other waste gases, without fouling the spark plugs or affecting the valves. The great increase in production of bromine in this country beginning in 1924 and continuing up to the present time, as shown in Table I, is due largely to the increasing use of ethylene dibromide in gasoline.

The photographic industry takes the second greatest tonnage of bromine compounds. Chief of these is potassium bromide, although sodium, ammonium and cadmium bromides are likewise employed to some extent. The main purpose is to form an emulsion of silver bromide in gelatin. This is spread on film or glass



Cluster of potassium bromide crystals which find industrial use in the manufacture of photographic emulsions and soap, also in medicine, engraving and lithography.

and in some cases paper, and is a light sensitive coating which after suitable exposure can be further developed and fixed by chemical means to give a permanent image of the object to which it was exposed.

Another extensive use for bromides is in pharmaceuticals, where the alkali salts are the safest nerve sedatives known. Sodium bromide is most extensively used, but other bromides employed for special formulas are the ammonium, calcium, magnesium, potassium, lithium and strontium compounds. Organic bromine compounds also are used for pharmaceutical purposes. Examples are bromoform, monobrom camphor, tribrom acetaldehyde, tribromethylalcohol, and tribromphenol. In the preparation of more powerful synthetic narcotics the organic bromine derivatives have been extensively used. The presence of the bromine atom in acid amides, ureas and other organic drugs improves their physiological activity.

In the related field of disinfectants and germicides 2-brom 4-phenyl phenol and its sodium salt have been used quite successfully. These are indicated particularly in combating the typhoid germ *Eberthella typhi.* The sodium salt is used where a water-soluble disinfectant is required, and the brom phenyl phenol for oil or non-aqueous mixtures.

The most common use of bromine in the dye industry is in the preparation of special shades of blue from indigo. The dibrom and tetrabrom indigos are the most extensively used, although the pentabrom finds some market. The addition of the bromine atom to the indigo molecule makes the dye brighter in color and more fast to light. It also improves the covering power. One of the scarlet thio-indigos when brominated gives a distinctive red dye which finds considerable use.

Methyl bromide is a very volatile, non-inflammable compound used as a refrigerant and in the production of dyes and pharmaceuticals. More recently, however, its use as a fumigant has gained considerable attention and gives promise of developing into an extensive market. Methyl bromide is particularly well suited for this purpose, because of its high insecticidal activity with no attendant injury to plants, grains, fruits, nuts, tobacco, etc. It has high penetrating value coupled with absence of fire hazard.

Some of the other bromine compounds which are on the market are listed below, together with their more common uses:

Acetylene Tetrabromide, because of its relatively high specific gravity, is employed as the limited medium in certain types of level gauges, and for the same reason it has been used for gravity separation of minerals.

Ammonium Bromide, in addition to use in the photographic industry, is valuable in fireproofing preparations and in engraving and lithography.

Cadmium Bromide is used in photography and also in process engraving and lithography, in the dyeing and printing of certain textile fabrics, and as an ingredient in galvanic plating baths.

Ethyl Bromide, used in organic syntheses and for the production of certain drugs and dyes; also as a local anæsthetic and as a refrigerant.

Ethyl Monobromacetate is utilized in the manufacture of tear gases.

Hydrobromic Acid, various intermediate products as well as synthetic dyes, drugs and special bromide salts are prepared with this acid, which also has pharmaceutical uses.

Monobrombenzene and Paradibrombenzene are used in organic syntheses.

Potassium Bromate. In the baking industry there is a demand for this in the propagation of yeast.

Price and production of bromine has varied considerably in this country since the industry started. In 1865 bromine sold at $8 to $16 per pound. This so stimulated production in the Ohio River Valley that by 1880 the price was only 28c per pound. In 1885 the Midland, Michigan district began producing bromine with an output of about 40,000 pounds for that year. At that time most producers pooled their selling through the National Bromine Company. As a result the price

went to 33c in 1886 and consumers began importing foreign supplies. In 1887 production dropped to 199,000 pounds as compared with 428,000 pounds the previous year, but the price remained about the same. During the next few years the price and production variations remained within a range of 10 per cent., but after 1891 when the joint selling arrangement expired the individual producers in this country got into a price war with German interests, so that the price of bromine dropped as low as 17½c per pound in New York. By 1893 the price was back to 25c and varied up to 30c in 1904. During that time production fluctuated from 348,000 pounds in 1893 to 897,000 pounds in 1904 and almost 1,200,000 pounds in 1905. This was an appreciable over-production and dropped the price to about 20c by 1907.

The struggle between domestic and German producers for the American market had become acute. Imported bromine and bromides were being sold at a lower price here than in Germany. To offset such competition The Dow Chemical Company withdrew from the domestic market and offered their bromine and bromides for sale in Germany at prices below those which prevailed in that country. This action brought an end of the trade war and each faction was content to adhere closely to its own market. By 1910 heavy imports from Germany ceased and prices and production returned to normal.

When the World War commenced in 1914 prices began to increase, until in 1916 bromine on the New York broker market sold for as high as $6.50 per pound. Table I shows the annual total production of free and chemically combined bromine in this country from 1914 through 1935. The same table shows also the average price received by the manufacturers per pound of bromine of their output. Table II shows the range of price for bulk liquid bromine on the New York market beginning with 1915.

The war stimulation of bromine production in this country resulted in an output of 1,854,971 pounds in 1919, the maximum annual amount up to that time, but the demand dropped off until the commercial treatment of gasoline with tetraethyl lead became extensive in 1924. At first ethyl bromide was employed in making the anti-knock compound and ethylene dibromide was added to the gasoline with the other necessary constituents. Later the method of manufacture of the organic lead compound was changed so as to utilize ethyl chloride, which was cheaper than the corresponding bromide. The use of the ethylene dibromide, however, has been continued up to the present time and this new market for bromine has shown a pronounced effect on production capacity in this country. The utilization of California bitterns in 1926 and drilling of an increased number of brine wells in Michigan during 1929 and 1930 swelled production from 2,033,804 pounds in 1924 to 10,147,960 pounds in 1933. The next year the production of bromine from sea water raised the annual output to 15,344,290 pounds and in 1935 it was 16,428,533 pounds. With this great increase during the past five years, the price netted to producers has stayed almost stationary, 20 to 21 cents per pound. On the New York market in bulk the price has remained between 36 and 38 cents. The 1936 statistics are not yet available but undoubtedly domestic production that year was greater than the one previous. With the capacity of the sea water plant of the Ethyl Dow Chemical Company in North Caro-

Table II

Wholesale Price Range for Bulk Bromine in the New York Market.*

	Per Pound Max.	Per Pound Min.		Per Pound Max.	Per Pound Min.
1915	$1.75	$ .40	1926	$ .47	$ .45
1916	6.50	1.20	1927	.47	.45
1917	1.50	.55	1928	.47	.45
1918	.85	.50	1929	.47	.45
1919	.85	.40	1930	.47	.45
1920	.95	.50	1931	.47	.36
1921	.52	.23	1932	.38	.36
1922	.28	.20	1933	.38	.36
1923	.31	.27	1934	.38	.36
1924	.31	.25	1935	.38	.36
1925	.49	.44			

* Compiled from Mineral Resources, U. S. Department of Commerce, 1914-1931, and Minerals Year Book, U. S. Department of Interior, 1932-5.

Table III

Bromine and Bromine Compounds Imported for Consumption in United States 1923-1935*

Year	Bromine Pounds	Bromine Value	Potassium Bromide Pounds	Potassium Bromide Value	Sodium Bromide Pounds	Sodium Bromide Value	Ethylene Dibromide Pounds	Ethylene Dibromide Value	Other Bromine Compounds Pounds	Other Bromine Compounds Value
1923	782	1,171	52,833	5,736	114,341	$ 10,574	——	——	4,123	$ 1,581
1924	37,318	8,958	935,749	124,414	713,659	110,215	——	——	52,408	13,071
1925	8,009	2,110	237,231	62,028	208,434	52,230	——	——	117,867	46,784
1926	37,839	14,486	70,440	18,549	212,365	73,313	——	——	271,645	102,894
1927	——	——	20,813	7,075	1,102	370	——	——	465,048	144,167
1928	——	——	23,231	7,918	——	——	283,205	$ 86,966	27,730	2,857
1929	17,573	5,804	28,310	9,834	110	51	443,004	104,917	643	572
1930	1,123	347	64,399	16,439	20,774	4,991	3,023,484	648,455	29,311	15,587
1931	25	24	58,411	18,983	——	——	1,570,840	358,082	43,856	23,116
1932	27	27	37,480	9,039	2,205	453	950,610	191,991	16,205	7,321
1933	——	——	9,921	1,813	4,410	744	290,410	55,864	4,156	3,410
1934	——	——	4,410	1,047	——	——	649,987	143,164	3,519	1,012
1935	22	22	8,910	2,904	2,000	530	477,005	89,810	5,310	8,664

* Compiled from Mineral Resources, U. S. Department of Commerce, 1914-1931, and Minerals Year Book, U. S. Department of Interior, 1932-5.

lina being doubled at the present time the 1937 production may approach 20,000,000 pounds and exceed that amount in 1938.

The treatment of motor gasoline involving ethylene dibromide likewise opened up a decided market for imports of that and related compounds. Following the war there were no bromine or bromide importations until 1921 when they were valued at only $84.00. In 1922 they rose to a total of 1094 pounds of materials valued at $339.00. Table III shows the pounds and value of imported bromine and its products from 1923 to 1935. In 1928 the U. S. Department of Commerce began isolating the ethylene dibromide imports and it will be seen from the table that the quantities of that material alone, brought into this country, jumped from less than 300,000 pounds in 1928 to more than 3,000,000 pounds in 1930. From that time on the imports have receded, due to increased domestic production. In 1935 they amounted to slightly less than 500,0000 pounds of ethylene dibromide and most of this probably was brought in temporarily for mixing with other ingredients, and then shipped to foreign countries.

With the economical recovery of bromine from sea water now a proven fact there is no fear about an inadequate source of raw materials. It is logical to believe that future developments in this country which require extensive new production of bromine will be satisfied with material made from that source. Furthermore, the development of the sea-water process has undoubtedly contributed to a more stable price range for bromine than existed in former years when it was more difficult for the supply to keep in step with the demand. Hence, with such a stable background from standpoint of production, and from the extensive uses which have been shown for bromine and its compounds, it is evident that Balard's "stench" of 1826 has become today a basic chemical commodity essential to efficient modern automobile transportation and to the comfort and pleasure of people everywhere.

Industry's Bookshelf

The Private Manufacture of Armaments by Philip Noel-Baker, Oxford University Press, London, England, 572 pp., $3.75.

Chiefly historical and carrying the story of the background and events up to the World War, this exhaustive study makes a conscientious attempt at impartiality. A preliminary volume which in effect outlines and sets up the problem of an extremely important contribution to an important and timely problem.

The Chemistry of Natural Products Related to Phenanthrene by L. F. Fieser, Reinhold Publishing Co., 330 W. 42nd st., New York City, 456 pp., $7.00.

A second edition with an appendix of 90 pages reviewing the developments of last year in this most rapidly advancing field of chemical matter. One of the most important volumes of the notable American Chemical Society monographs.

Applied Chemistry for Engineers by A. F. H. Ward, Longmans Green & Co., 114 Fifth ave., 127 pp., $1.75.

A neat and useful little pocket-book of applied chemistry dealing with water analysis, corrosion, fuels and the other chemical subjects of particular interest to mechanical and electrical engineers.

Flour Milling Processes by J. H. Scott, Van Nostrand, N. Y., 415 pp., $4.

A complete theoretical and practical exposition of the modern practices of the milling industry, notably important for its material on the machinery used in this field.

The Air Seasoning & Kiln Drying of Wood by Hiram L. Henderson, J. B. Lyon & Co., Albany, N. Y., 332 pp.

The actual records from kiln operation would alone make this book a notable contribution, were it not for the very satisfactory descriptions of both yard and kiln drying operations and the results obtained from them.

Contemplative Organic Microanalysis by Fritz Pregle, translated by E. Beryl Daw from the fourth German edition of Dr. Hubert Roth, Blakiston's, Phila., 271 pp., $5.

An enlarged, revised and modernized edition of the standard work of Pregle, founder of microanalysis, increased by some thirty-five pages.

Organic Chemistry by Frank C. Whitmore, Van Nostrand, N. Y., 1080 pp., $7.50.

Its completeness and clarity promise to make this the standard college text book of inorganic chemistry for years to come—an extremely notable accomplishment in text book writing and an invaluable reference book as well.

Modern Soap Making by E. G. Thomssen & C. R. Kemp, MacNair, Dorland Co., 254 W. 31st St., N. Y., 541 pp., $7.50.

A truly practical handbook for the soapmaker dealing with all his problems from raw material to glycerin recovery and the analysis of soap products: a mine of exact information on methods and materials.

Quantitative Pharmaceutical Chemistry by G. L. Jenkins and A. N. DuMez, McGraw-Hill, N. Y., 466 pp., $3.50.

Pharmaceutical applications of quantitative analysis brought up to date to conform with the official changes in analysis of materials in the U. S. P. and the N. F. (2nd Edition).

Colloid Chemistry by Jerome Alexander, Van Nostrand, N. Y., 504 pp., $4.50.

The broad and rapid increase of our knowledge of colloids makes this fourth edition of "Alexander" timely and useful —a complete and careful revision of the entire text.

Mechanical Testing of Metals and Alloys by P. Field Foster, Pitman, N. Y., 267 pp., $3.55.

Descriptions of modern testing equipment coupled with its use and ably supported by a practical description of the theory underlying modern mechanical means of testing metals and alloys.

Metallic Corrosion, Passivity and Protection by Ulick B. Evans, Longmans Green, N. Y., 720 pp., $15.

An enormously important work summarizing modern knowledge on corrosion and modern methods of protection against it. Each chapter is divided into three sections, first, the scientific basis; second, the practical problems, and third, the quantitative treatment, an arrangement that admirably fulfills the purpose of making the book of extreme usefulness both to the scientist and to the practical man.

First West of the Alleghanies

The Story of the Grassellis

Eugene Ramiro Grasselli: 1810-1882

IN 1839, a chemical manufactory had been established and the production of sulfuric acid, alum, and Le Blanc soda began at that point. That simple statement of historic fact reveals a man of clear-sighted chemical vision and uncommon courage. His vision, recognizing that capable chemical manufacturers were established in the industrial centers of the Atlantic seaboard, went beyond the heavily wooded slopes of the Alleghany Mountains—a barrier then crossed only in creaking ox carts—and foresaw correctly the economic empire of the Middle West. His courage was undaunted by the peculiar risks and difficulties of chemical manufacturing on the frontier far from the base of all industrial supplies.

That man of vision and courage was Eugene Ramiro Grasselli. But he was no reckless dreamer. His plans for a chemical-making enterprise at that outpost on the Ohio River had been carefully thought through to a definite economic conclusion based upon sound chemical logic. For he was a trained chemist—educated at the Universities of Strasbourg and Heidelberg—the son of a long line of chemical manufacturers, with practical experience gained in a gruelling apprenticeship served under his own father's direction in the family plant.

The story of Eugene Ramiro Grasselli's success is not cut from the usual American patterns. He was neither a sturdy son of the Pilgrim Fathers nor a scion of Virginia's first families. He was not born in a log cabin. His boyhood was not spent barefoot on the farm. He was not even a friendless, penniless immigrant seeking his fortune in this land of opportunities. He came of an Italian family which, since medieval times, had been druggists and chemists. The ancestral records go back to 1440 when at Torno, on Lake Como, the Grassellis were established as makers of medicine and perfumeries, chemicals and gunpowder.

At Torno his father, Giovanni Angelo Grasselli, was born in 1781; but as a young man he moved to Strasburg, Alsace, France, there to launch himself independently in the chemical business. Unsettled conditions in Northern Italy and a young man's desire to win his own success, doubtless prompted this migration. Soon after the plant at Strasburg had been established, in order to avoid the prohibitive import duties that Germany then levied against France, a plant was opened in 1810 at Wohlgelegen near Mannheim, Germany. In both plants sulfuric acid was the principal product, and the history of the Verein Chemische Fabrik, Mannheim, gives credit to Giovanni Angelo Grasselli for having been the first to bring Sicilian brimstone into Germany. Muriatic acid was also produced and the common salts of both these acids.

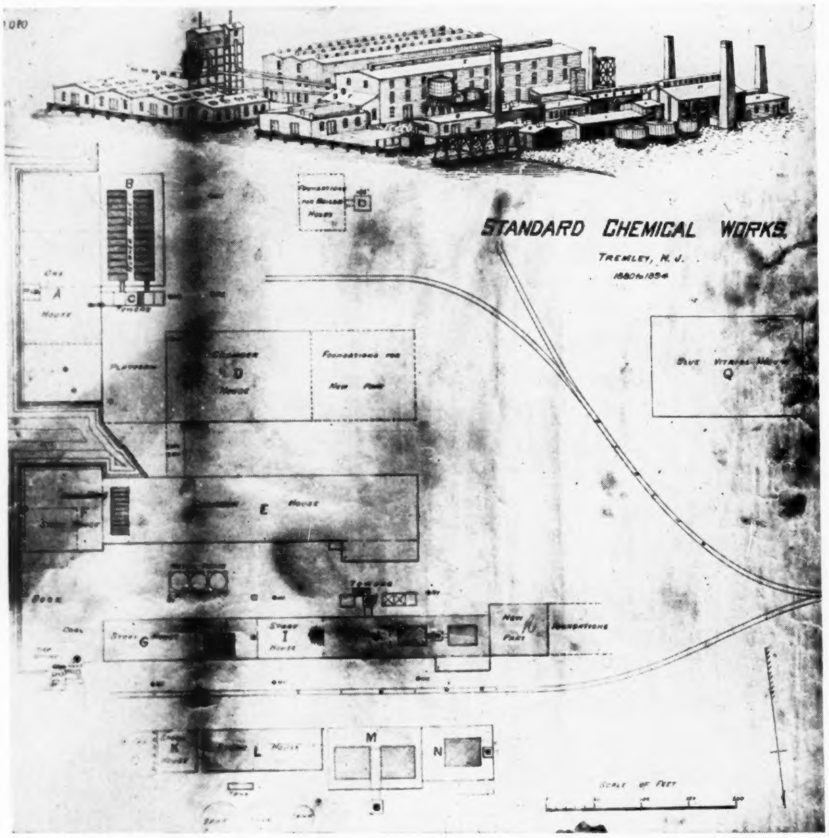
It was in Strasburg, January 31, 1810, that Eugene Ramiro Grasselli was born. There he was raised under French influence, and when he came to America, although he had attended German universities, French was his "native" tongue. He landed in Philadelphia in 1837 and found employment there with Farr and Kunzi, remaining with them two years. Doubtless from the first he considered the connection but temporary, giving him an opportunity to become acclimated to the strange land and to study the American chemical field. He came to this country inspired by the ambition, as his father had been when he left the family's ancient headquarters on Lake Como, to supply chemicals of his own manufacture to a new and growing market.

Accordingly, as early in the spring of 1839 as it was possible to travel, young Grasselli left Philadelphia. He took the train as far west as it then went, to Harrisburg; on to the foot-hills of the Alleghanies by canal; across the mountains by ox cart, and so into Pittsburgh. From Pittsburgh transportation on the Ohio River was

available by river barge, and he took this opportunity to study locations which came under his observation on this long journey of some five hundred miles to Cincinnati.

Of the various locations observed he found Cincinnati, a community of 42,000, already a thriving manufacturing center and decided to settle there. Diversified industrial development had taken place, and cattle, which at this time grazed in great numbers on the open prairies of Ohio, were brought to Cincinnati and the packing industry there gave rise to the manufacture of its by-products into soap and candles. Here was an immediate chemical market, while for the future the opening of the territory to the west and south held forth a promising prospect.

A few hundred feet from the city limits of Cincinnati he found the building site he was seeking, a triangular piece of land located on the Miami and Erie Canal which drew its waters from Lake Erie at Toledo, continued its course to Cincinnati, and emptied into the Ohio River. Projected railroad facilities were provided by a charter of the Little Miami Railroad granted in 1836, the first section of which was opened in 1843.



Working plans of the old Standard Chemical Works, 1880 *to* 1894, *the foundations upon which were built later the big scale operations at Grasselli, New Jersey.*

On this site he established his first factory in 1839. The office and factory building faced East and West, the factory facing west 75 feet frontage; facing east 90 feet; along Martin Street 225 feet; along East Front Street 345 feet. Sulfuric acid chambers covered a lot 165 feet frontage on the north side of Martin Street and extended back 30 feet to a hillside. The construction was a combination of stone, brick and wood.

Sulfuric acid was the key product, used at first chiefly in further chemical processes, while alum, soda ash and Glauber's salt were the principal items sold. Later nitric and muriatic acids and ammonia were produced, together with a number of pharmaceutical preparations. The market for these products expanded rapidly and the bold venture prospered. Within six years a direct competitor appeared in Cincinnati, The Marsh & Harwood Chemical Company, established by David M. Marsh and Edward Harwood, destined years later to become allies, even associates, of the Grasselli interests.

In 1845, however, Eugene Grasselli's immediate answer to this competition was to improve his own processes. From France he imported the first platinum acid refining still to be erected in the Middle West. He personally laid the brick and adjusted the loam cushion upon which this valuable piece of apparatus was to rest. A few years later, in apparatus of his own design and making, he began the manufacture of chloroform.

This item was to assume great importance during the Civil War, which created not only a great opportunity for the sale of chemicals but also undreamed of difficulties in their manufacture. Since the lower Mississippi was in the hands of the Confederates, Sicilian brimstone had to be imported through Philadelphia, and added to the extraordinary rail freight charges across the mountains was a war tax of $6 per ton. Chile nitrate, commandeered for munitions, was virtually unobtainable. Currency was deflated and prices fluctuated widely. Shipments both to and from Cincinnati became highly uncertain. In the face of these difficulties, Eugene Grasselli determined to forge ahead.

During the war period Grasselli sales, formerly handled by Allen & Company, wholesale druggists in the West, and by James P. Morgan & Company in the East, had been taken over directly by Grasselli himself. An efficient sales organization was developed by R. H. Andrews a shrewd merchant and competent organizer. At the close of the war a rapid industrial expansion began in the Middle West. There were developments that in particular opened up new, great consuming fields for sulfuric acid. Petroleum refining, steel treating

The Grasselli Chemical Works at East Chicago, taken September 20, 1893. At the time this plant was built it was to that date the most ambitious new project of the Grasselli enterprises.

(especially the cleaning of wire and nails), and the manufacture of ammonium sulfate from the ammonia in the wash water of the gas works, were all in their infancy but growing rapidly. New competition began to appear. At Pittsburgh James Irwin, an Ohio River steamboat captain, was erecting a new acid plant. A group of Cleveland petroleum refiners, including Hussey & McBride, W. C. Schofield, and W. P. Eells, president of the Commercial Bank, had incorporated the Cleveland Chemical Works.

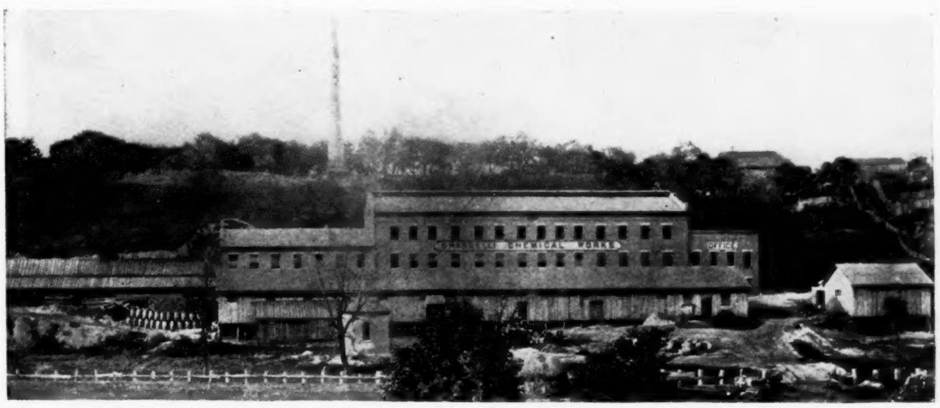
Eugene Grasselli determined to meet these developments aggressively. In 1865 he built a new plant at Cleveland, Ohio, and since the location was obviously better, both in respect to raw materials and to customers, he resolved to move his headquarters there.

This meant uprooting his family. He had married Fredericka Eisenbarth in Philadelphia and they had eight children. The eldest, a daughter, Lucretia, had married Daniel Bailey, a promising young mechanical engineer who was now connected with the business. The fifth child, a son, Caesar Augustin Grasselli, then a boy of seventeen, was already working with his father; in fact, at fifteen he left school to go to work in the plant. Many years later when this same boy became the Chairman of the Board of the great Grasselli Chemical Company, he wrote: "I cannot remember the time when I was not interested in chemistry and did not expect to follow my father in this business."

Father and son had had a long serious talk. Eugene Grasselli pointed out to his son that a thoroughgoing apprenticeship through every operating and administrative department would give him, if supplemented by some formal instruction in chemistry, a training of great practical value. With that charm and sincerity for which he was always noted he pictured to the youthful Caesar the romance of the chemical industry, its great service to civilization as the handmaiden of all manufacturing activity. This was rich fuel to fire the enthusiasm of a boy who, by long inheritance and strong inclination, was foreordained to a chemical career.

The next day young C. A. Grasselli donned overalls and went to work in the acid plant. Nights he studied chemistry by special arrangement with a professor from the Karlsruhe University. Always he was under the friendly, watchful eye of a father who instructed him in practical mechanics and engineering in the machine shop, made opportunity for new experiments, disclosed process workings, and finally taught him the commercial end of the business through office training, instructing him in new duties and putting on him always increasing responsibilities. Thus, as has so frequently happened in the American chemical industry, the enterprise founded by the father as a personal business was carried forward by his son to become a great corporation.

C. A. Grasselli's first opportunity came with the building of the new Cleveland Plant. Land had been purchased on the Cuyahoga River. The plans were drawn by Eugene Grasselli himself, and here he again took advantage of a location beside a river and beneath a high hill. The execution of these plans he put in the hands of his engineer son-in-law, Daniel Bailey. The boy, Caesar, went along as his assistant and on that construction job worked as a brick-layer and stone mason, plumber, pipe-fitter and a tin-smith, mechanic and boilerman. Literally he knew that plant from the ground up.



The Grasselli Chemical Works at Cleveland from a photograph taken in 1869. Note the high stack on the hill and the rural surroundings of what is now a completely industrialized location.

Caesar Augustin Grasselli

Eugene Grasselli was actively engaged in the operation of the business in Cincinnati. Daniel Bailey supervised the construction of the plant on Independence Road in Cleveland, and as a monument to the conclusion of the engineering and soundness of the plans from which the plant was built, the buildings erected during this original construction still stand and are useful today in the Cleveland Works. They stand as a tribute to the efficiency and the painstaking, conscientious execution of the work entrusted to Daniel Bailey. Through his long life and connection with these interests he was one of the main supporters of Caesar Grasselli in his many activities.

By the spring of 1867 the new plant was ready to go into production. The Grasselli family moved to Cleveland, Daniel Bailey returning to Cincinnati to take up his duties at that point. From an operating point of view the beginning was auspicious. Eugene Grasselli had made the most of his wide, practical experience, nor had he hesitated to introduce innovations. Up to that time sulfuric acid chambers in this country had been soldered, but he had brought to Cleveland a Frenchman named Valiant, skilled in the new art of burning overhand lead seams. Output in the new apparatus exceeded even calculated capacities, but the booming chemical demand which had prompted the new plant collapsed suddenly in the post-war panic of 1867. After six months' operation, in the first week of January, 1868, the total sales were sixty-eight cents and the cash receipts seventy-five cents.

Their troubles were aggravated by an epizootic epidemic, a sort of equine influenza that paralyzed the horse-drawn transportation of the Middle West. Oxen were brought in from the farms to haul wagons, and teamsters familiar with these bovine prime movers commanded fancy wages. Deprived of their horses, everyone in the sections affected by the epidemic was compelled to walk. C. A. Grasselli walked three miles morning and night from his home to the plant, while in Cincinnati Mr. Bailey must trudge seven miles twice a day. It was at this time that the high-wheeled velocipede first became widely popular.

During the first seventeen years of its operation there was no railway siding in the Cleveland plant. It was not until 1884 that a spur was run out from what was then known as the Valley Railroad. Up to that time all materials that could be shipped by water came into and went out of the plant from the adjacent canal. Horses and drays moved all other materials. The coming of the railway prompted shipments of acid in tank cars. These were built of iron plates and had a carrying capacity of 27,000 pounds. Remembering the 60 pound rails of that time these seemed heavy loads, but the Grassellis believed that greater capacities were possible, and in later years broke all records with a tank car carrying seventy tons of sulfuric acid.

Chemical demand having died during the panic of 1867, chemical prices sickened dangerously, and the convalescence of the market was made tedious and difficult because the largest consumers, the oil refiners, were just at that time engaged in a life-and-death struggle. In their fierce competitive battle each sought every advantage and all pounded away at sulfuric prices, endeavoring to purchase as cheaply as possible. The situation became critical for the acid makers. In self defense they formed a protective alliance.

In those days the approved method of thwarting the price chiseller was by means of "gentlemen's agreements," and Messrs. Eells and Schofield representing the Cleveland Chemical Works, David M. Marsh of Marsh & Harwood, and Eugene Grasselli agreed to hold down production and to stop cut-throat competition. They further agreed that Mr. Marsh was gradually to take over the Cleveland Chemical Works, and Mr. Grasselli furnished a large part of the capital to make this purchase. Eventually these two acquired that company and so the ancient rivals became partners. This connection was more closely cemented when in 1870 they joined in buying out the plant built at Titusville, Penna., by Mr. Rainey of the Lodi Acid Works in New Jersey. Close to the Titusville plant they put a new refinery for the recovery of sludge acid. This plant was erected by John Metz, apprenticed a plumber, who became a chemical engineer and later was in charge of the works at Grasselli, New Jersey. Soon after this Eugene Grasselli bought out his partner's interest in these two Titusville plants and placed Julius Daub, a discreet Hollander, in charge. At the same time Mr. Marsh assumed active control of the Cleveland Chemical Works, having as secretary of that company I. H. Mansfield, formerly of Hussey and McBride, whose

son Howard is today director of sales of Grasselli chemicals.

In the meanwhile the oil refiners were battling unmercifully. Prices went lower and lower and in 1872 all the important refiners gathered at the Metropolitan Hotel in New York. They invited the acid manufacturers from all over the country to meet with them. Their invitation veiled the threat to enter the acid business themselves so that the chemical manufacturers decided that discretion was the better part of valor and that they had best enter into negotiations. From their headquarters at the St. Nicholas Hotel they sent forth their envoy, Mr. Mansfield, to meet Charles Pratt, the minister plenipotentiary of the oil people. Mr. Mansfield delivered the counter-ultimatum that if the refiners made acid, the chemical makers would refine oil. At that time the chemical manufacturers, while not so numerous, commanded greater financial resources; and after protracted negotiations by this form of collective bargaining, which today seems very strange and unorthodox, a fair price for sulfuric acid was established.

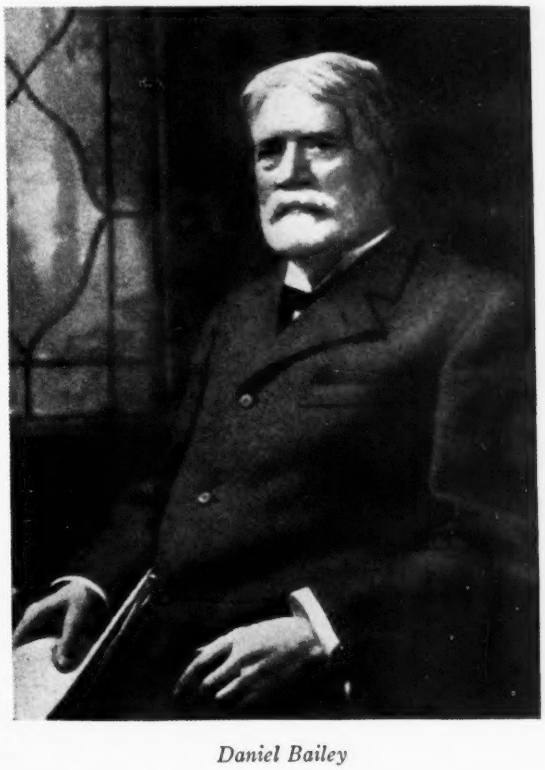
From the very first the connections of the Grasselli firm with the development of the petroleum industry were intimate. In the very early days of the oil refining industry, Eugene Grasselli undertook in a small plant, known as the Newport Oil Company, Newport, Kentucky, to extract petroleum from cannel coal. For reasons not in the records this venture was never successful.

Many years later John D. Rockefeller, who had been an acid customer since 1860 and whose original refinery was almost adjoining the Grasselli Cleveland plant, proposed a combination of the interests to C. A. Grasselli. This proposal was undoubtedly prompted by the feeling that the chemical knowledge and experience then developed in the Grasselli organization could be made very useful in expanding scientifically the refining of petroleum. C. A. Grasselli was to take care of and develop the chemical industry in connection with the oil interests, which development was to be continued under the personal direction of Mr. Rockefeller. Mr. Grasselli inquired what provision was to be made for the Marsh interests, and receiving the reply that there was no need for Mr. Marsh in the picture, he refused to give any further consideration to the matter because of his loyalty to his old friend.

The Cleveland newspapers of March 21, 1873, carried in their classified columns a modest announcement of great import to the Grasselli family: "My son, Caesar A. Grasselli, has been admitted as partner in the above works, said partnership to have effect from January 1st, 1873. E. Grasselli." The business was continued under the name E. Grasselli & Son, until the death of Eugene Grasselli, January 31, 1882.

C. A. Grasselli, or "C. A." as he was universally known among his friends and associates, continued the development of the manufacture of sulfuric acid as a major product. Early convinced that this acid ought to be produced close to its market, he considerably increased the number of Grasselli plants. The first steps in this direction were taken in 1889, when the Marsh & Harwood Company was wholly absorbed and The Standard Acid Works in New Jersey purchased. This latter was the nucleus around which the great plant at Grasselli, New Jersey, has grown. The Marsh & Harwood interests were already operating plants at Broughton, Pittsburgh, and Beaver Falls, Pennsylvania; Olean, New York; and Willow, Ohio. Expansion continued steadily. In 1892 the plant at East Chicago was built, and the plant at Birmingham, Alabama, in 1899. In this southern location the company branched out into the manufacture of acid phosphate and mixed fertilizers. Through the purchase of the Standard Acid Company, Tonawanda, New York, in 1900 acetic acid was added and this material was later produced both at Grasselli and East Chicago. In 1902, with the purchase of the Standard Silicate Company, Fortville, Indiana, silicate of soda became one of the Grasselli products.

Up to this point the development of the Grasselli Company had been rapid but along established lines. Points had been carefully selected in the center of good consuming areas, and sulfuric acid plants were erected in which a logical chain of chemical products was produced. In 1904, however, C. A. Grasselli broke with this traditional policy. At Clarksburg, West Virginia, he erected furnaces for the manufacture of zinc. Additional plants for zinc smelting were later erected at Meadowbrook, West Virginia, and Terre Haute, Indiana. The extraction of sulfur from zinc-bearing



Daniel Bailey

ores was carried on in various sulfuric acid plants at East Chicago, Cleveland, Niles, New Castle and Canton, and the roasted cinders shipped to the zinc plants in Meadowbrook, West Virginia, and Terre Haute, Indiana. Just before his death another plant was added at Wurtland, Kentucky.

C. A. Grasselli was powerfully equipped for success as a chemical industrialist. He had, as we have seen, a thorough grounding in plant construction and operation. Behind this knowledge and experience he had a contagious enthusiasm for the chemical industry, backed by a profound conviction of its fundamental importance in modern civilization. He was an extraordinary executive, building up a huge organization on the model supplied him by his old friend, John D. Rockefeller. This was based on the committee form of administration, an organization to which the Grasselli Company adhered long after most large corporations had adopted the so-called staff-and-line system. His primary interest was always production, but he was a good merchant and he had great financial ability. During his lifetime the assets of the company under his control grew from $600,000 to $30,000,000.

His business life spanned the period of the American chemical industry's development from a comparatively few simple, standard, inorganic chemicals to the large scale production of a complex line of both organic and inorganic materials. His experience began at the acid chambers and ended at the head of the directors' table. Under his management the company passed from a personally conducted proprietorship to a highly organized corporation. Living through this tremendously expansive period, he himself grew. Yet to the very end he was always a personal leader rather than an impersonal executive. As long as he was active in affairs he maintained intimate contact with his men. And he was so cheery, so frank, so generous a personality that all who came in close contact with C. A. Grasselli loved him.

Like Edward Mallinckrodt, that other great chemical pioneer of the Middle West, he was an open-handed philanthropist. A devout Roman Catholic, his warm human sympathies reached out into those charitable institutions which administered to the sick, the helpless, the blind, the maimed, the orphaned. His closest interests were two homes, the one for the blind, the other for crippled children. In her later years his wife was an invalid, and after her death he remodeled and equipped their beautiful residence on Euclid Avenue and gave it as the Johanna Grasselli Home for Crippled Children. Another residence was given for work among the blind, and is today the headquarters for the "Society for the Blind." Only a few months before his own death, "the blind" held a reception for him and presented him with a small silver cup which he kept on his library mantelpiece. "I keep it here," he said to intimate friends once. "It is too full of love even to hold flowers."

C. A. Grasselli married in 1871, a schoolmate of his sisters in Cincinnati, Johanna Ireland. On their wedding trip they went to Europe and then began long years of friendship and business association with a number of foreign chemical firms. First he went to Torno and saw on ancient doorways heavy brass plates bearing his family name. He visited the scene of his grandfather's earliest chemical triumph in Strasburg, which city was just then going through the phase of being assimilated by Germany after the Franco-Prussian War. He went to the Wohlgelegen Works near Mannheim and was shown the big, square, substantial stone building his grandfather had built, and in which he had made sulfuric acid from Sicilian brimstone. In addition to meeting the leading chemical manufacturers of France and Germany, he crossed the Channel and visited Sir Charles Tennant at his famous St. Rollox Works near Glasgow.

More than a quarter of a century passed before Mr. Grasselli again visited Europe. In 1899, accompanied by I. P. Lihme, the company's chief chemical engineer, he made another chemical tour. He visited the plants of Weiler Ter Meer near Cologne, of Vorstner and Bruneberg at Kalk, the zinc works of Julius Grillo at Oberhausen, the Frankfort and Griesheim plants of Cassella, the Bayer works at Leverkusen, the Goldschmidt zinc chloride plant, the Hoechst works of Meister Lucius and Bruning, the Merck pharmaceutical plant at Darmstadt, and the Badische Anilin und Soda Fabrik. Everywhere he made important business connections and won new, warm friends; Dr. Duisberg, Dr. E. Merck, Max Hasenclever, Dr. Pauli, Dr. Brunck, and Franz ter Meer. It is quite characteristic of him that after the World War he never wanted again to visit Europe.

C. A. Grasselli died July 28, 1927. Outside of the immediate realm of his chemical business he had won important distinctions. King Victor Emanuel III had knighted him in 1910 with the Order of the Golden Crown of Italy, and in 1921 made him a commander of that same order for the honor which he had brought to the name of Italy in other lands. In 1923 Pope Pius XI bestowed upon him the decoration of St. Gregory the Great. Two American universities had conferred upon him the honorary degree of Doctor of Science. For many years he had been president of two savings banks, which in 1921 were merged with the Union Trust Company, of which institution he became and continued to be a director. Mrs. Grasselli had died in 1910, but their five children were living, T. S. Grasselli, president of the company, Eugene R., vice president and treasurer, Josephine and Ida Grasselli, and Mrs. W. T. Cashman.

A year after his death, in October 1928, the Grasselli and the du Pont interests were merged, and one hundred fifty thousand shares of du Pont stock, with a market value at the time of over $64,000,000, were exchanged. The consolidation was consummated by T. S. Grasselli and Lammot du Pont, whose fathers, C. A. Grasselli and Lammot du Pont, had, back in the early 80's, seriously considered a combination of their inter-

ests. Those negotiations had been abruptly broken off, March 29, 1884, by the sudden death of the elder Lammot du Pont.

C. A. Grasselli and the elder Lammot du Pont had many business dealings together, and this little personal footnote to the history of their companies is an appropriate ending to this story.

Lammot du Pont, who was a vigorous and original-minded chemical genius, visited C. A. Grasselli one day in Cleveland, seeking a sulfuric acid of then unheard of strength and purity.

"I think we can make it," said Mr. Grasselli.

"I'll bet you a box of cigars you can't."

The acid was made and delivered. In due course two boxes of the finest cigars were delivered to Mr. Grasselli's office. One of the original boxes lay in Mr. Grasselli's cigar humidor, and in his handwriting on the bottom of the box was an inscription definitely identifying these as the cigars having been won from Lammot du Pont by the wager. On his death the cigar box and contents came to his son, T. S. Grasselli, who, when the consolidation was completed, gave them to Lammot du Pont.

Pyrites Industry in 1936

Reflecting increased activity in the chemical industries, domestic pyrites production established a new record high in '36, according to Robert H. Ridgway and A. W. Mitchell of the U. S. Bureau of Mines. Output rose to 547,236 long tons containing 39.6 per cent. sulfur compared with 514,192 tons containing 39.5 per cent. sulfur in '35. Of the '36 total 361,482 tons were consumed by the producing companies and 181,494 tons were sold compared with 348,891 tons and 163,911 tons in '35. Twenty-one per cent. of the output was reported as lump and the remainder fines, the bulk of the latter being flotation concentrates. Production of coal brasses were reported by two operators in Illinois and one in Kansas.

Tennessee had the largest production in '36; other producers were California, Colorado, Illinois, Kansas, Missouri, Montana, New York, Virginia and Wisconsin.

Imports of pyrites for consumption in '36 were the largest since '29 and amounted to 429,313 long tons compared with 397,113 tons in '35. Imports from Spain, the largest source, decreased in '36, due to civil war conditions in that country. Imports from Spain, however, were augmented by increased shipments from Canada and by shipments from Portugal. Of the '36 total Spain furnished 309,114 long tons, Portugal 59,804 tons, Canada 55,105 tons and Belgium 5,290 tons.

Exports of pyrites are not shown separately by the Bureau of Foreign and Domestic Commerce. No exports were reported by the producing companies in '35 and '36.

The average price of pyrites, as quoted by trade journals was 12-13 cents per long ton unit of sulfur throughout the year.

Sun-burn Proofing for Textiles

By preventing the transmission of ultra-violet light certain materials assist in preventing sunburn. Aesculin is one of the most favored, though a little expensive. Quinine salts are also used in ointments for application to exposed parts of the body. The I.G. have patented certain stilbene derivatives and phenylbenzimidazole is stated to be protective in layers as thin as 0.03 mm., allowing the skin to tan without at the same time causing blisters. Japanese Patent No. 111,539, 1935, reveals a new method of preventing the after effects of too long exposure.

Names of the Month—

A Current Supplement to the Chemical Who's Who

BISSELL, Everett S., gen. mgr., Mixing Equipment Co.; b- Springfield, Mo., 28 Mar. 1901; mar. Jewell E. Myers, Weir, Kans., 24 June 1923, 2 sons; educat. Kans. State Teachers Coll., B.S. 1928. U. S. Marine Corps, Schl. of Chem., principal 1920-22; United Chem. Co., compounding foreman, 1922; Procter & Gamble, analyst 1922; Dodge Bros., lab. res., plant control 1923-28; Bausch & Lomb Optical Co., chg. application study, tech. advisor sales 1929-37. Memb. A.C.S.; Kappa Delta Pi. Club: Chamb. Comm. Hobbies: photography, astronomy, books. Address: 1026 Garson Ave., Rochester, N. Y.

MERCK, George Wilhelm, pres. and dir., Merck & Co., Inc.; b- N. Y. City, 29 Mar. 1894; mar. Serena Stevens, Nov. 1926, 3 sons, 2 daus.; educat. Harvard, A.B. 1915. Entire career with Merck & Co., Inc. N. Y. & Long Branch RR, dir.; United N. J. RR and Canal Co., dir.; State of N. J., memb. Banking Advisory Bd.; N. J. Chamb. Comm., dir. and v-p.; Orange Memorial Hospital, memb. Bd. of Governors; National Conference of Jews and Christians, dir. Memb. Mfg. Chemists' Assn., exec. com.; Amer. Drug Mfrs. Assn., exec. com.; Nat'l Assn. of Mfrs., dir. for N. J. Clubs: University, Harvard, Chemists', Down Town Assn. (N. Y. City); Essex (Newark, N. J.); University (St. Louis); Essex County and Rock Spring Country (W. Orange, N. J.); Quogue Field, (Quogue, N. Y.). Address: Merck & Co., Inc., Rahway, N. J.

PARKS, Harold Coburn, lab. chf., Devoe & Raynolds Co., Inc.; Cleveland, 24 Sept. 1894; mar. Dorothy E. Page, Merchantville, N. J., 17 Apr. 1923; 1 son; educat., Yale Shef., Ph.D. 1917. Dr. Henry A. Gardner, Inst. Paint & Varn. Res., res. chem., 1919-25; Congoleum-Nairn, Inc., control res. chem. 1925-28; Devoe & Raynolds Co., Inc., res. chem., lab. hd. 1928 to date. U.S.A., duration of war. Memb. A.I.C. Hobbies: tennis, golf. Address: 34 Oliver St., Newark, N. J.

STAUFFER, William Otterbein, supvr., chem. project div., res. dept., Remington Arms Co.; b- Easton, O., 25 Dec. 1897; mar. Pauline Stubbs, West Elkton, O., 28 Nov. 1925; 2 daus.; educat., Otterbein Coll., B.S. 1922; Ohio State Univ., M.S. 1925. Ohio Salt Co. 1922-23; Otterbein Coll., instr. 1923-24; duPont Co., exp. sta. 1925-36; Remington Arms Co. 1936 to date. U.S.A. 1918-19. Arranged table of solubilities of inorganic substances for Chem. Engineer's Handbook. Memb. A.C.S.; Sigma Xi.; F. & A. M. Hobby: woodworking. Address: Remington Arms Co., Bridgeport, Conn.

SYMONS, George Edgar, chf. chem., Buffalo Sewer Authority; b- Danville, Ill., 20 Apr. 1903; mar. Virginia Thompson, Sullivan, Ill., 16 July 1928, 1 son; educat., Univ. Wis. 1922-24; Univ. Ill., B.S. with honors 1928, M.S. 1930, Ph.D. 1932. Interstate Water Co., chem. 1921-22, 1924-25; San. Dist. Decatur, Ill., chem. 1925-26; Ill. State Water Survey, res. chem. 1928-33; Univ. Ill., instr. chem. 1930-33; Freeport Sulphur Co., res. chem. 1933-34; Sullivan, Ill., consultant 1934-35; Greeley & Hansen, engr. 1935-36; Buffalo Sewer Authority, chf. Chem., 1936 to date. Moultrie Co., Ill., Planning Commis., chmn. 1934-35. Investigations of the biochem. oxygen demand test, sludge digestion, mechanism of methane fermentation, chlorine demand of sewage. Memb. A.C.S.; Sigma Xi; Phi Lambda Upsilon; Mu San. Hobbies: Photography, writing. Address: Bird Island Lab., Buffalo, N. Y.

Hideo Itoh, managing director, Nippon Kali Industry, brother-in-law of Mr. Mori and right-hand man in the Mori Konzern, one of the fastest growing of Japan's chemical enterprises.

Who's Who and Why

in Japan's Growing Chemical Industry

By Dr. Herbert Leopold

Gisuke Aikawa, heir to the Kuhara fortune and president of the Nissan concern, Japan's largest holding company which recently acquired control of Dai Nippon Artificial Fertilizer.

JAPAN'S remarkable chemical advance is best seen in a few basic figures. At the end of 1935 the total capital investment in this industry totaled 1,577,000,000 yen, about $450,000,000. This figure includes annual investments in new and extending corporations amounting to $20 million in 1932, $50 million in 1933, $60 million in 1934 and $65 million in 1935. Last year's new investments are estimated at well over $100 million.

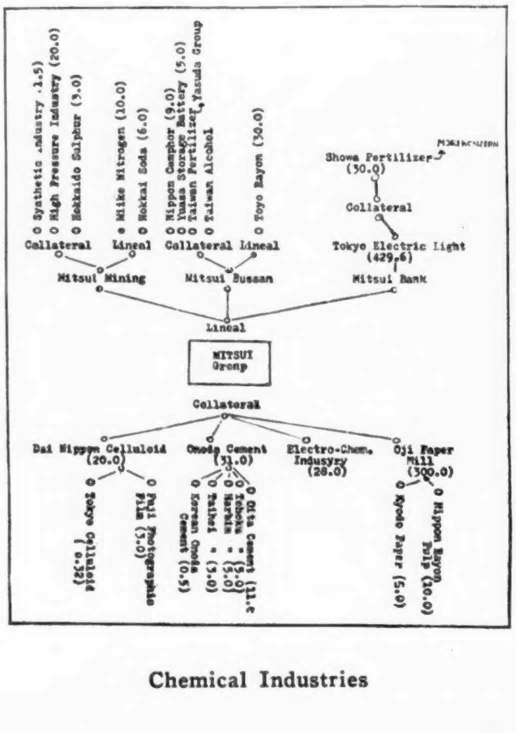
Chemical plants totaled 4,300 in 1934, against some 80,000 industrial plants, so that each twentieth factory in the empire is devoted to some form of chemical manufacture. The number of workers employed was 192,000 in 1934, forming 8.88 per cent. of the total industrial workers of the country. The returns for 1935 indicate an increase of 36,000 hands, while last year probably a further gain has been scored.

The aggregate output of the chemical industry in terms of value, now in the neighborhood of 2 billion yen a year, is second only to that of the textile industry. It amounted to 826 million yen in the year 1931, 957 million yen in 1932, 1,300 million yen in 1934, 1,826 million yen in 1935, and reached last year, as stated, 2,000 million yen, or $580,000,000.

Dr. Kotaro Honda, discoverer of K. S., Thom, and Sendust alloys, and an outstanding contribution to Japan's scientific and industrial metal progress.

Nobuteru Mori, son of a local seaweed iodine maker, who has built up the closest knit chemical operations in the Orient.

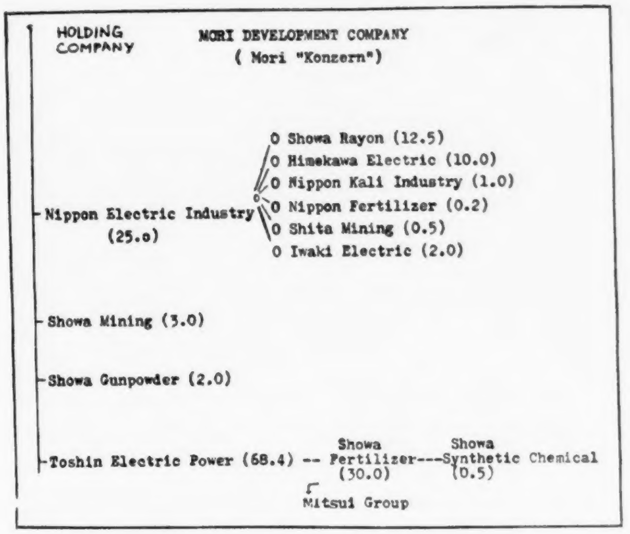
Yurei Nakano, one of the younger chemical leaders of Japan, who at present heads the Nichitsu concern.

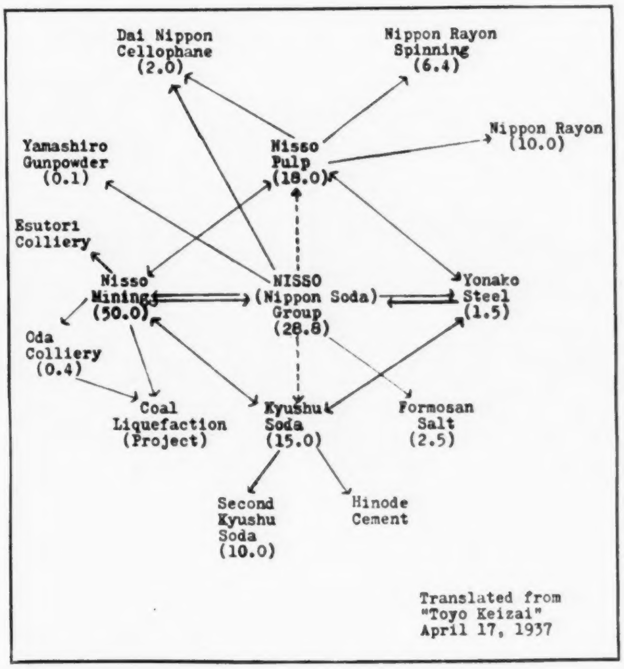


Jun Noguchi, electrical engineer, trained in Italy and Germany, backed by Mitsubishi capital, who dominates recent Japanese electrochemical developments.

The distribution of capital and plants in the various departments of the industry is as follows:

	No. of Plants	Paid-up-Yen Capital
Pharmaceutical	579	94,930,000
Industrial Chemicals	532	117,762,000
Dyestuffs	32	21,666.000
Paints, varnish	206	27,708,000
Soaps, cosmetics	241	32,335,000
Matches	44	8,499,000
Fats and oils	217	97,882,000
Rubber	343	36,052,000
Celluloid	47	15,274,000
Rayon (pulp & yarn)	24	282,313,000
Paper	218	251,542,000
Fertilizers	187	293,401,000
Others	230	76,201,000





It thus appears that the chemical fertilizer industry leads all others with an invested capital of more than 293 million yen. But if we take into account quite recent recapitalizations, the first place doubtless is due to the rayon industry, with the fertilizers as runner-up and paper a close third.

The average capital per factory is 11.9 million yen in the rayon industry, 1.6 million yen in the fertilizer industry, and 1.15 million yen in the paper industry. From the table below it becomes clear that the rayon industry has been making the most striking advance in recent years.

For 1936 detailed figures in all items are not available, but the commodities of which the 1936 production increased most conspicuously over 1931 were rayon (457.9%), soda ash (310.7%), sulfate of ammonia (280.8%), calcium cyanamid (157.4%), bleaching powder (93.0%), superphosphate of lime (83.1%), while many of the remaining items probably will show gains around 50 per cent.

Reducing the 1928 production to 100 (Toyo Keizai index), we arrive at the following tabulation:

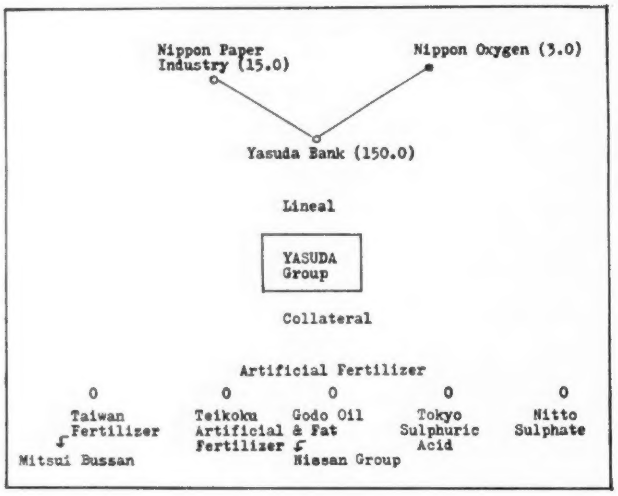
	1931	1935	1936	1936 incr. over 1931	1936 incr. over 1935
Composite Average of all commodities	108	192	212	+ 96.3%	+10.4%
Chemical commodities					
Rayon	214	921	1194	+457.9%	+29.6%
Caustic soda	131	280	310	+136.6%	+10.7%
Soda ash	299	1135	1228	+310.7%	+ 8.2%
Bleaching powder	86	168	166	+ 93.0%	— 1.2%
Sulfate of ammonia	177	510	674	+280.8%	+32.2%
Calcium cyanamid	359	853	924	+157.4%	+ 8.3%
Superphosphates of Lime	77	128	141	+ 83.1%	+10.2%

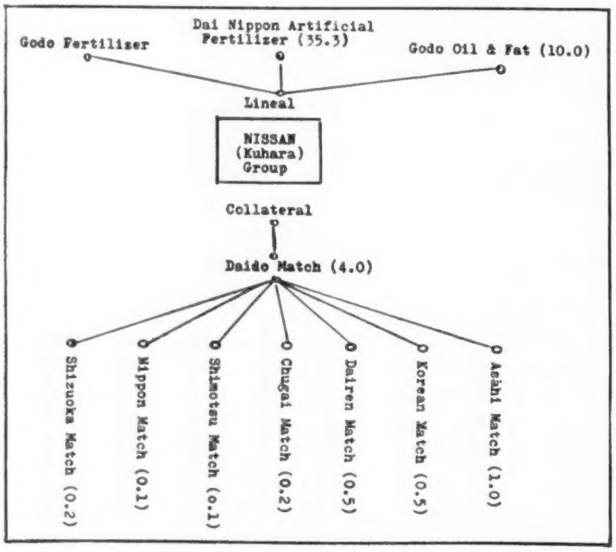
The main factors which either alone or in combination have governed the development of most chemical trades in recent years are: absence or abundance of raw materials; military demand; cheap electric power; demands of the textile industry; overpopulation and necessity of extensive cultivation of soil (fertilizer).

The related Celluloid industry has forged ahead at a tremendous gait, and unless since 1933 the United States or Germany has doubled its output, Japan is still leading by a broad margin. Japan has, it should be recalled, an almost limitless supply of natural camphor.

"Chemurgic" crops, of which Japan is possessed with huge resources, are utilized at a large scale for the manufacture of various oils, plastics, insecticides, etc., and in this field notable research work has been done, almost unnoticed by the outside world. The latest result of such researches is the establishment of a 10,000,000-yen plant to utilize soya bean stems and husks as rayon pulp material. Production of essential oil derivatives is considerable and has given birth to a respectable perfumery industry.

In Europe and America many important chemical enterprises started on a couple of test tubes, have developed their own processes, devised their own manufacturing machinery. When Japan started as a chemical producer, during and after the world war, it must have seemed pretty hopeless to duplicate a development that had a hundred years head start. At this late date buying foreign processes, machinery and engineers was plainly expedient, but provided that money had been abundant, it still seemed a risky affair to invest in the chemical industry where raw materials and plant invest-





ment and not labor cost governs the price of the product. It is the labor factor on which Japan's industry thrives. For the same reason Japan did not have an automotive industry till 1935.

Thus, only a few corporate organizations were able to take chemical chances. These were, first of all, the houses of Mitsui and Mitsubishi, the biggest dragons on the queer economic tapestry of the empire. Minor "plutocracies" followed, the Yasudas, the Okawas, the Kuharas, and others.

Among them, only the Mitsuis had had any considerable interests in industry. The other groups had been predominantly in the banking, underwriting, shipping, railroad, and mining lines.

Up to 1926, these two groups controlled well over 95 per cent. of the country's chemical industry. The companies were, as a rule, managed by auditors of the banking interests, and there was hardly a single man in an executive position who will be remembered as a great chemical industrialist.

During the past ten years, however, three important outside enterprises, identified with three amazing figures, have firmly established themselves beside this cast iron ring. These are Jun Noguchi's Nippon Nitrogen Fertilizer (Nichitsu); Yurei Nakano's Nippon Soda (Nisso); and Nobuteru Mori's Nippon Electric Industry (Nippon Denko).

With their respective affiliated companies they control now at least one-third of the industry. Although their financial background, it should be added, features "plutocratic" money nevertheless the Mitsuis and the Mitsubishis and the other groups who have a capital share in these rapidly growing chemical concerns are being kept in safe distance from the controlling chairs.

Jun Noguchi's background is an engineering education in Italy, where he went after his graduation from the electrical engineering department of Tokyo Imperial University (1896). For some time he was in the service of Siemens & Halske of Germany. Before he returned home (1907), he acquired a number of Italian patents and set up shop in Korea (1912), where he has made his permanent home. This first enterprise after several extensions and reorganizations with the aid of Mitsubishi money became eventually known as the Nippon Nitrogen Fertilizer Company, Nichitsu for short. Jun Noguchi's trick is to buy out promising foreign patents, most of them related to electro-chemistry. The patentees, it is said, are in most cases only too glad to dispose of their rights on the terms he offers, because many of the processes are unworkable under other than Japanese or, perhaps, Norwegian, power supply conditions.

As for Nippon Soda, it is no exaggeration to say that during the past five or six months each day has brought news of Mr. Nakano's expansion projects. No longer only a chemical company, Nippon Soda has now established itself as the "Nisso Konzern." Following in the tracks of Nichitsu and the "Mori Konzern," Nisso is by no means less aggressive.

Classified Production Value
(Unit, Y1,000)

Types	1929	1931	1933	1934
Drugs, medicine	78,093	60,063	75,584	88,864
Industrial chemicals	116,269	113,553	205,111	214,535
Dyestuffs, mediums	15,856	12,717	34,041	35,938
Paints, varnishes	39,203	34,341	52,615	54,900
Soaps, cosmetics	70,571	60,215	72,889	80,517
Illuminants	8,666	6,437	15,501	19,086
Mineral oil	37,291	43,035	78,012	91,208
Animal, vegetable oils, fats, tallow	50,524	30,647	50,781	79,506
Rubber	76,599	56,105	86,705	103,218
Paper, pulp	211,250	145,808	175,925	218,447
Celluloid	19,508	10,404	24,202	27,644
Rayon	45,393	50,696	104,072	147,548
Photographic goods	2,437	2,970	4,717	8,115
Fertilizers	177,774	135,520	172,486	186,860
Leather	17,500	12,707	22,802	25,522
Vegetable, volatile oils	15,146	11,183	14,533	15,720
Tannin extract	——	59	148	196
Perfumes	893	1,143	1,822	4,052
Resinous goods	373	754	2,287	——
Phonograph records	6,030	6,154	11,640	13,220
Vulcanite fiber	1,132	731	1,450	1,257
Paste, mucilage	3,669	2,976	4,982	4,656
Abrasives	1,687	1,010	2,616	3,683
Carbon products	1,616	1,574	3,396	6,585
Coke	25,710	16,569	21,048	41,231
Briquets	4,351	5,505	11,154	12,819
Charcoal	691	202	132	119
Others	26,351	12,176	23,027	25,811
Grand total	1,077,314	825,082	1,299,656	1,514,886

Note: Figures are from the Commerce Office factory statistics.

Figures prepared by the Mitsubishi Economic Research Bureau relating to business conditions of chemical industries follow:

Chemical Industrial Companies, 1936

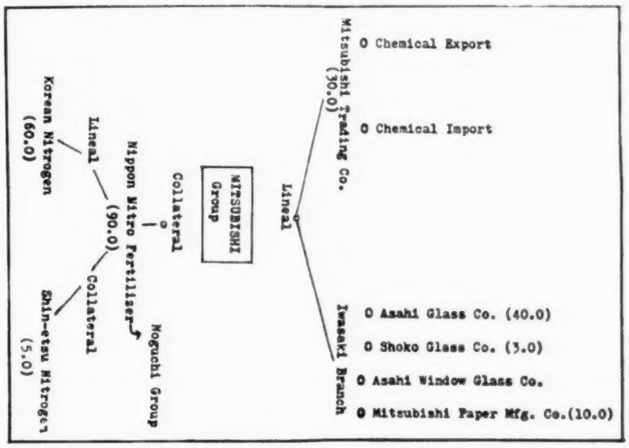
Industries	1935 Second Half Profit Rate %	1935 Second Half Dividend Rate %	1936 First Half Profit Rate %	1936 First Half Dividend Rate %	1936 Second Half Profit Rate %	1936 Second Half Dividend Rate %
Cement	13.0	8.2	11.4	8.2	11.4	8.2
Tiles and bricks	12.1	7.7	9.8	7.0	10.8	7.8
Glass	24.2	18.2	23.2	18.2	20.8	14.1
Chemicals	19.0	8.6	19.9	10.3	19.2	8.6
Ind. chemicals	15.4	11.0	11.0	8.2	8.4	5.4
Hides and leathers	14.3	8.2	18.7	8.2	19.2	8.7
Rayon	15.3	12.5	13.5	10.9	12.2	10.1
Paper	17.8	10.0	16.1	9.4	15.4	10.0
Chem. fertilizers	12.3	9.1	13.1	9.3	13.2	9.8
Other Chem. Industries	15.8	9.2	17.4	9.8	18.7	9.8

In point of capitalization, however, the Nisso concern is still in an early stage of development, the aggregate authorized capital being 143 million yen. This figure may be regarded as irrelevant, considering the sound backing the concern has from the Dai-ichi Bank and the Nippon Industrial Bank. Nisso's holdings in some twenty enterprises range from 27% to 97%. The company's present policy is to limit its holdings to 35%. The table below shows the corporations that are most closely connected with the mother concern:

Companies	Capital (Y1,000)	Paid-up Capital (Y1,000)	No. of Shares	No. of Nisso Shares	Nisso Holdings as %
Kyushu Soda	15,000	3,750	300,000	80,850	27.0%
Nisso Rayon Pulp	18,000	4,500	360,000	150,000	41.7%
Yonago Steel	1,500	750	30,000	11,280	37.6%
Shoko Petroleum	100	100	2,000	1,000	50.0%
Showa Internal Combustion Engine	300	240	6,000	4,670	77.8%
Formosa Salt	2,500	1,500	50,000	24,765	49.5%
Daiichi Sangyo	300	150	6,000	2,210	36.8%
Yamashiro Explosives	100	100	2,000	1,700	85.0%
Dai Nippon Cellophane	2,000	1,250	40,000	16,000	40.0%
Ryuho Metallurgical	500	500	10,000	5,760	57.6%
Budo Mining	500	500	10,000	5,100	51.0%
Nisso Metallurgical	50,000	12,500	1 million	600,000	60.0%
Second Kyushu Soda	10,000	2,500	200,000	194,300	97.2%
Nippon Rayon Spinning	10,000	2,500	200,000	194,300	97.2%

The company originated in 1920 as electrolytic manufacturers of caustic soda. Mr. Nakano, who only last year was called to the presidency in succession to Torahiki Suzuki, has been with the company as chief engineer since its establishment. He was formerly an assistant professor of physics and discovered the Nakano electro-analytic process. The fact that under his presidency the concern has suddenly taken the lead among Japan's expanding chemical enterprises has given rise to a good deal of speculation.

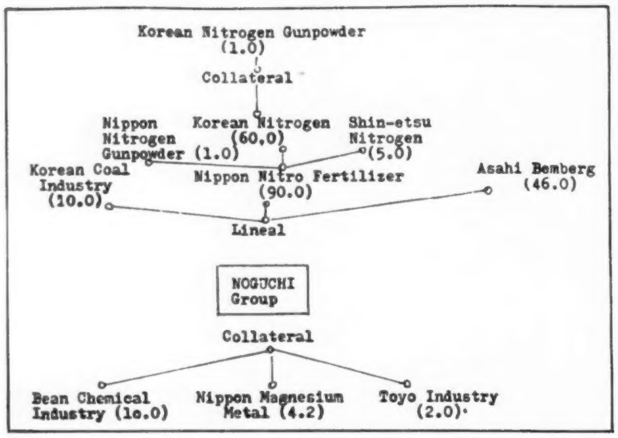
Nobuteru Mori, president of the "Mori Konzern," was born in October, 1884, in a little village of Boso Peninsula, where he spent his youth around the iodine plant of his father, a local "oyabun" or sea-weed contractor. The Boso people collected the laminaria and ecklonia, from which iodine is extracted, during three months of the summer and fall, and the output often decreased, when the fishermen had a good season for their natural avocation when the plant was doomed to idleness. Young Mori, succeeding his father in the

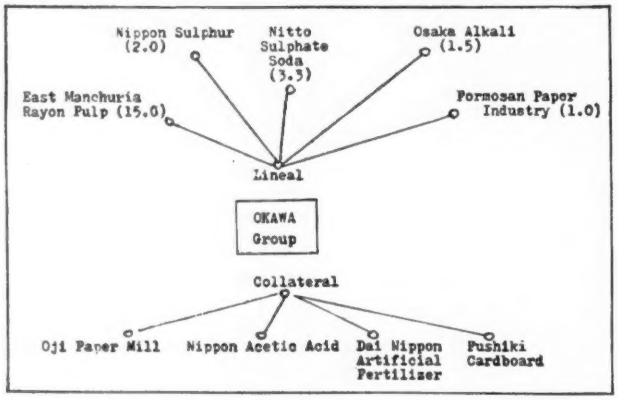


iodine business shortly before the world war, realized that the only way to get the fishing people to stick to their jobs was to make the collecting of seaweed a better proposition than fishing.

Just then, the Tokyo Industrial Experimental Station of the Ministry of Commerce and Industry had discovered a process by which activated carbon and alginic acid could be obtained as by-product in the iodine extracting process. Unfortunately the only way to commercial utilization of this method was via electricity. But if electric power could be obtained cheap, Mori calculated, this would be a fair solution of his problem, because the intensified utilization of the seaweed would warrant a higher price for the raw material. Financially backed by a wealthy foodstuff producer, Saburoske Suzuki, Nobuteru Mori established in 1917 the Toshin Electric Power Co., in which his patron had the controlling interest. The electrified iodine business now went under the style of Nippon Electric Industry, depending for its power supply on the Toshin plant.

This first experiment in industrial chemistry already embodied Mori's fundamental idea that it is the utilization of waste which makes for survival and "organic expansion," as distinct from the mere monetary expansion of the Mitsui and other financial groups. Yet Mori had considerable difficulties in steering his new enterprise through the post-war depression and had to resort to Mitsui money to keep it afloat. In order to get access to the Mitsuis he identified himself with the





Seiyukai, on whose ticket he has been four times elected to the Diet.

The growth of the Mori "Konzern," as the enterprise is now styled, began in the Showa era, for which most of its subsidiaries are named. (Emperor Showa, since 1926). It now comprises ten distinctly chemical companies, all of which draw on the electric power resources of the Toshin Electric Company, now a 68-million concern. Besides, the Mori Development Company, of which Mr. Mori is president, has the controlling interest in numerous mining, plantation, and heavy industrial concerns. Like Napoleon, Mori fills all executive posts in his chemical empire with brothers and brothers-in-law, most promising among them being Hideo Itoh, managing director of the Nippon Kali Industry.

As the president used to put it, he has "built up one industry on the garbage can of the other." The chloride residues of the iodine plant gave birth to a match factory, whose wood supply together with the sulfate waste of the fertilizer factory became the main raw-material resources of Mori's first rayon pulp enterprise.

The Mori "Konzern" is probably the most organically built industrial machine in the orient, considering that an analogous waste revolving process is followed in point of financial economy, with sudden capital shifts from one subsidiary to the other as a regular feature.

Production and sales for '36 of calcium chloride and mixed calcium-magnesium chloride obtained directly from natural brines represent a considerable increase over previous records; being 125,911 short tons, valued at $1,909,908, or an increase of 50% in quantity and 85% in value over similar figures for '35.

Barite and Barium in 1936

Barite mining in the U. S. continued to recover rapidly in '36. The Bureau of Mines reports a 20 per cent. increase in apparent consumption over '35 and, although the total was still short of the pre-depression peak, domestic producers obtained a larger share of the business, as imports have decreased. Notwithstanding the larger shipments of the crude mineral, production and sales of barium products—ground barite, lithopone, and barium chemicals—were a trifle less in '36 than in the preceding year and imports of these products likewise were reduced slightly. Price quotations showed only minor variations in '36.

Crude Barite

Production, sales, stocks: Production of crude barite in '36, 274,062 short tons, increased 55,987 tons or 26 per cent. over the '35 output. Total sales amounted to 283,160 tons valued at $1,674,631, an increase of 26 per cent. in tonnage and 34 per cent. in value over '35. The average value per ton was $5.91 as compared with $5.56 in '35. Of the total sales, 57 per cent. or 160,866 tons originated in Missouri. Stocks in producers' hands had decreased 10 per cent. at the end of the year from those on hand at the end of '35. States producing crude barite in '36 were California, Georgia, Missouri, Nevada, Tennessee and Virginia.

Shipments from Georgia amounting to 38,435 tons valued at $206,336 increased 26 per cent. in tonnage and 16 per cent. in value over '35. Four companies operated during the year, mining in Bartow County near Cartersville.

Barite mined in Missouri in '36 amounted to 155,063 tons as compared to 118,765 tons in '35, an increase of 31 per cent. Sales increased to 160,866 tons valued at $1,008,528, a gain of 22 per cent. in quantity and 39 per cent. in value over '35. Four companies operating within the State accounted for the total output of barium products and chemicals in '36, consuming 61,385 tons of crude barite in the manufacture of ground barite and artificial barium sulfate (blanc fixe).

Shipments of barite in Nevada in '36 were reported by three companies, the Chemical & Pigment Co., Inc., of Oakland, Calif., the Industrial Minerals and Chemical Co., of Berkeley, Calif., and J. L. Warner, of Reno, Nev. Although the production in '36 was only a few tons greater than in '35, sales of barite were greatly in excess of '35.

The tonnage reported as produced in Tennessee was double the output of '35. Shipments from Virginia were made by two companies and showed a decline of 15 per cent. from '35.

Foreign trade: Imports of crude barite for consumption into the U. S. in '36 amounted to 33,843 short tons valued at $170,316, a decrease of 28 per cent. in tonnage and 31 per cent. in value from '35. Netherlands was by far the leading source of crude barite in '36 with 26,714 short tons, an increase of about 6,000 tons over '35; direct imports from Germany went to a new low of only 110 tons, having declined steadily from 41,117 tons in '31. France, with 5,040 tons was the second largest shipper of crude barite to the U. S. Spain, which in '35 furnished 15,401 tons of barite to this country, shipped only 22 tons in '36.

Exports of crude barite are not separately recorded.

Barium Products

Sales: In '36, sales amounted to 263,810 short tons valued at $16,299,448. The amount of barite used in the production of barium products increased from 290,344 tons in '35 to 303,449 tons in '36.

Foreign trade: Imports of barium compounds for consumption in the U. S. in '36 amounted to 11,076 tons valued at $411,797. Imports in '35 were 11,671 tons with a value of $404,601. Exports of lithopone, 2,538 tons valued at $229,942, showed an increase in tonnage compared with the 2,372 tons exported in '35. The average value per ton, $90.60 in '36, decreased 3 per cent. below the average of $93.43 in '35.

Samples and Sampling Problems of Chemical Manufacturer or Distributor

THIS brief outline is intended to suggest means whereby sampling and sample despatching can be more efficiently used for sales promotional and other purposes. The correct treatment of samples is an important and often neglected feature in the handling of chemical goods. Broadly, there are three aspects to consider—the drawing of a representative specimen, appearance and care in packaging, and correct despatching.

Samples are presented to the prospective buyer for either analysis or visual inspection. Since the usefulness of a specimen for analysis is no greater than the care with which the original containers are sampled, the importance of correctly drawing such samples is apparent. In certain industries, so much importance is laid on this point that regular bonded samplers, mutually acceptable to seller and buyer, are employed to take samples in the presence of the seller's representative, specimens being sealed in the seller's plant. Where the volume of business does not justify this, the consulting chemist or testing laboratory representative fills this function. The subject of drawing good average samples is dealt with so fully in textbooks, that no detailed description is called for in an article of this nature. It may be in order to point out, however, that, since quite considerable values are frequently involved in a fractional variation in composition of chemical goods, careful sampling, followed by accurate analysis, can more often be profitably employed. This is particularly true where a large proportion of chemical materials purchased are imported and sold without further testing.

Packaging

It is a fact that the packaging of sales samples in the chemical and related industries does not keep pace with the general trend of improved package design. The merchandising value of a well packaged sample is overlooked. This is, perhaps, due in part to the fact that the seller deals in commodities normally handled in cars, drums, barrels, etc., and feels that the small sample package can be simple and unadorned without bringing an adverse reaction from the recipient. This viewpoint overlooks the fact that the purchaser's taste is being molded by retail package design and that his first reactions may be of importance, particularly if the object of the sample is visual inspection only. Adverse results may be avoided by the observance of a few simple rules. A sample should: (1) be representative, (2) be adequate in size, (3) create a good impression, (4) be contained in a carton designed for the convenience of the customer, (5) be so packaged, marked and stamped as to conform to postal and express regulations, (6) be so addressed that it is correctly routed on arrival at its destination, (7) be properly followed up in due course to obtain the customer's opinion.

From the seller's viewpoint, the problem of correct packaging is not a simple one. His goods vary widely in physical condition. They may be solids, liquids, or pastes. Some are lumpy, some viscous, some volatile, some corrosive, some inflammable, some toxic. It is not possible, without considerable study and probably an investment in a fair quantity of packaging material, to supply containers which will meet all requirements of the contents, package them in strong, attractive cartons, which will pass postal regulations and organize their despatch to ensure their receipt by the correct consignee.

Types of Containers

The supplier of chemicals may find the following general outline of value in laying in an adequate supply of sample materials.

SOLIDS: For samples of 1 oz. or less, and powders which are non-deliquescent and non-corrosive, a strong jute paper envelope, with a metal-reinforced closure, attached in such a way as to allow of maximum opening for filling, is convenient. If the company name is printed at the opposite end to, and parallel with the closure, the name of the contents can be typed on to the envelope without difficulty. For the sake of appearance, the envelope should be inserted in a "Cellophane" wrapper before sealing. Where visibility is desired, square bottles in clear glass can be obtained standard. Certain glass companies supply the 2, 4, and 8 oz. sizes with the same cap size (for example, 33 mm.). This permits of the economical purchase of a fair quantity of closures of the same size. Where larger samples are required, and visibility of the contents is not important or the material is lumpy or inclined to cake, rather wide-mouthed penny-lever cans are preferable.

The lining material of the bottle caps is of importance. Various materials are offered by the manufacturers, such as oil and pulp, rubber hydrochloride, vinyl acetate resin-impregnated paper, metal, etc. Most of these are satisfactory for solids; but if it is desired to standardize on the same type of lining for all types of sample containers, tinfoil is probably the most suitable.

LIQUIDS: Where visibility of the contents is desirable, and where the liquid can be exposed to light without chemical change, and is not hazardous if the container is broken, white glass bottles of 2-8 oz. may be used. If the liquid is quite fluid, narrow-mouthed bottles, 20-24 mm. cap size, meet the case. But, if the bottle is to contain viscous liquids or pastes, wide-mouthed jars 50-70 mm. cap size are essential for convenience in filling and emptying. These jars may also be used for lumpy or caky solids which are for visual inspection and of which a fair-sized sample is desired. Where visibility is not of importance, or where a liquid is affected by light and is hazardous if the container is broken, but non-corrosive, a narrow-mouthed screw-cap can of the "metal polish" type with soldered seams is most suitable. Brown glass bottles have limited use for liquids whose color or stability is affected by exposure to light.

In the above, the size of the container has been limited to 8 oz., because this will usually be the limit of size which will package so as to weigh, when mailed, 1 lb. or less, this being the maximum weight permitted at sample rate. Larger samples up to 15 lbs. may be sent by parcel post, or express may be used.

Acids which are corrosive and otherwise hazardous are usually put in glass-stoppered bottles, the stopper being enclosed in plaster of Paris molded to shape, covered with cheesecloth, tied firmly and coated with paraffin wax, after setting. Liquids which contain dissolved gases, such as aqua ammonia, or which develop pressure due to decomposition, such as hydrogen peroxide, should be placed in bottles having pressure release caps. Such liquids should not, of course, be sent through the mails, but despatched by express.

Packing

Liquids of all types should invariably be packed in sufficient absorbent material completely to soak up the contents of the container, should it be broken. Where the liquid is corrosive or oxidizes organic matter, the mineral packing material, such as kieselguhr or whiting, should always be used; otherwise

cotton batting or absorbent tissue is satisfactory. In the case of solids, a thickness of at least 3/16" of corrugated paperboard around the bottle meets postal requirements. For larger bottles containing solids, a good quality wood or paper excelsior is preferable. Sawdust is always a nuisance to the person opening the package and should be avoided.

Cartons

The Canadian postal regulations require that samples must be sent, when practicable, in covers open at the ends and put up in such a manner as to be easy of examination. A special point is made that dyes are not admitted at the sample rate to any place in or outside of Canada, unless enclosed in stout tin boxes, placed inside wooden boxes, with sawdust between the covers. Where the requirements of the sample post specifically prohibit the mailing of such materials, owing to their nature or the weight of the sample, parcel post can be used. Section 135 of the Postal Guide specifies that liquids, when not in glass bottles or vials, must be enclosed in a wooden heavy cardboard or papier-mâché block or tube, not less than 3/16" thick in the thinnest part; and powders may be sent in the manner prescribed for liquids, or in similar material, in such a manner as to prevent any escape of the contents. The despatching of samples by express is governed by rules laid down by the Canadian Railway Commission in some detail, including such specifications as type of lumber, size of nails, spacing of nails, and labelling of the boxes, for such materials as acids. These regulations also contain a list of hazardous materials and the proper markings, with their maximum permissible weight. These are too detailed to be given in full, but should be studied by those expressing chemicals in sample quantity or small consignments.

Labels

A good label should be printed on a stock which is coated sufficiently to prevent finger marking, but not so much as to make typing difficult. Special attention should be paid to the quality of the gumming, and to facilitate typing, especially in smaller sizes, the labels may be printed in strips which are chain perforated so as to be straight-edged when detached. Distinctive printing in one or two colors adds much to the appearance of the sample, and the inks used should, preferably, be light-fast. Labels for use on cans should be of sufficient size to overlap and gum on to themselves at the back of the can, unless a gum paper is obtainable which will adhere satisfactorily to metal.

Other points of consideration in dressing-up a sample include the use of embossed bottle tops in either Bakelite or double metal, embossed metal seals printed in colors, "Cellophane" wrapping, dye-cut Kraft outside wrappers and "Cel-o-seal" plastic caps for glass-stoppered bottles.

Organization

Few firms handling chemicals can justify departments for this division of their activities, even though sample-despatching is centralized at one point; but satisfactory results can only be obtained by making this responsibility at least a special part-time activity of an employee trained to exercise care and neatness. In general, a warehouseman, used to handling chemicals in bulk, does not fill this job satisfactorily. The question of covering the sample with a despatch note, advising the consignee of its arrival is worthy of consideration, since samples will often be misdirected or lost after arrival at the addressee's plant. Copies of this despatch note serve as file references for follow-up at a later date. Prepared by Staff of *Canadian Chemistry & Metallurgy*, June 1937, p. 220.

LEAD

New Uses in Industry

By A. P. Knapp and R. T. Jaeger*

Andrews Lead Co., Inc.

When it is necessary to transport or process the corrosive liquids and acids which are part of the every day life of industry, the unexcelled qualities of lead pipe are relied upon.

This ancient and durable metal is extruded in practically all diameters and lengths through the use of great hydraulic presses which force the plastic lead between steel cores and dies and shape it to the desired specifications.

Perhaps no other form of pipe has been as constantly used throughout the centuries to the extent, or with nearly as good success, as lead pipe has been.

This durable metal is fashioned by expert lead workers into a wide variety of acid equipment.

The following uses to which lead pipe is put consume hundreds of miles of this product yearly. Heating coils, cooling coils, tank outlets, vapor lines, transport lines, pump lines, condenser tubing, fittings, elbows, return bends, salt water lines, and, of course, drinking water has passed through pipe lines made of lead all over the world.

The popularity of lead is based on its ability to resist the severe corrosive action of heavy acids, its ready workability, the long continuous lengths and wide variety of sizes in which it is available, and to the low cost of a complete trouble-free installation. An important cost factor is the high scrap value of lead which works as a credit memorandum against replacement cost after a unit is no longer usable. The market for scrap lead is a ready one and companies find no difficulty in disposing of such scrap material.

A construction project recently completed in western Pennsylvania illustrates the value of lead piping excellently.

In this instance a lead pipe line enabled two large manufacturers located in the same vicinity to work out a mutual problem. In the case of one plant a by-product sulfurous gas was passing through their stacks into the atmosphere where it was dissipated and lost. The second plant located some distance away, manufactured sulfuric acid by the chamber process, which incidentally requires the use of millions of pounds of lead.

To successfully trap the sulfurous gas, conduct it across the intervening space, and empty it into the chamber system to be converted into sulfuric acid, required the use of a pipe line which could be successfully constructed across the difficult terrain.

The material in this pipe line must be capable of withstanding the corrosive action of the gases which would pass through it on the inside, continuously night and day, as well as atmospheric corrosive conditions which might be calculated to attack the outside of the pipe.

Of course, a matter of consideration was the cost of such an installation, the length of life which might be expected from it, and the ease with which it could be repaired, should repairs be necessary, at some future date.

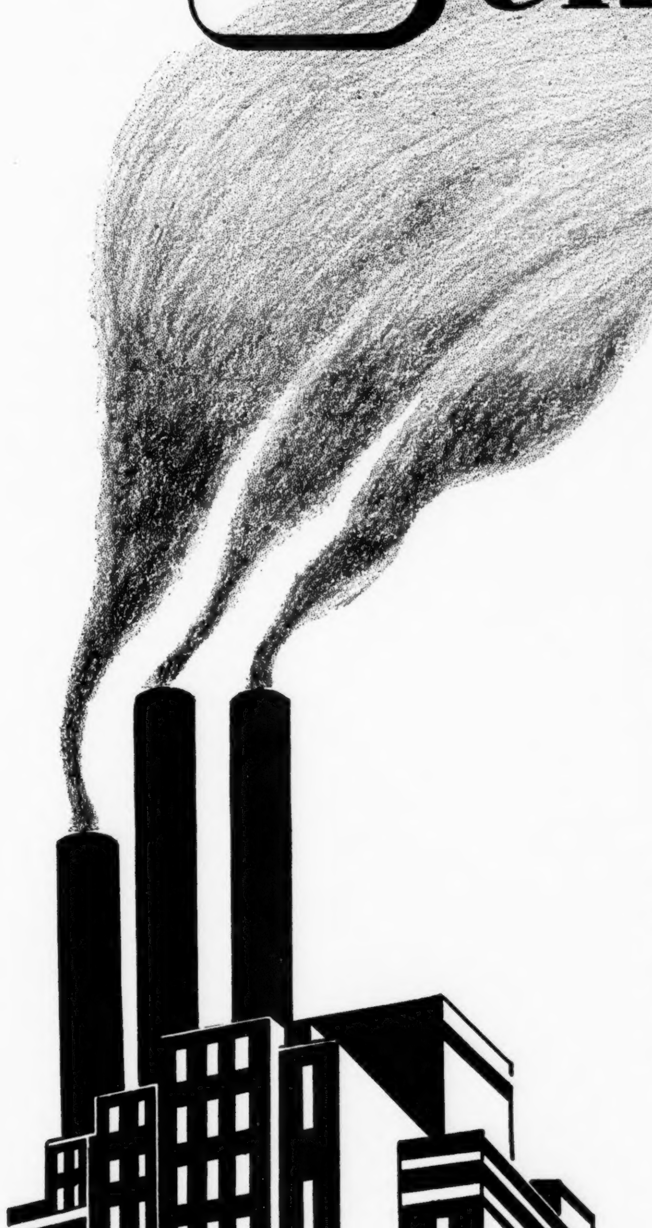
Actually, lead pipe was the only material which has without question every one of the above requisites.

The installation is a most interesting one and we, therefore, have detailed its construction.

In order to erect this line it was first necessary to fabricate 18 inch diameter lead pipe from sheet lead 5/32 of an inch thick. This sheet lead weighs 10 pounds to the square foot. Sheets of lead of this thickness, ten feet long, were rolled around a wooden form to the shape and diameter required. A

* *Vice-President and Vice-President and Chief Engineer, Andrews Lead Co.*

STAUFFER chemicals



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flat seam was then lead burned along the full length of the pipe so that a perfect tube was formed.

In order to simplify the erection of the pipe when it arrived on the job, steel hangers constructed in two pieces from 3 inch by ¼ inch steel were applied to the pipe and spaced on 30 inch centers. These hangers were supported directly to the pipe by eight lead straps which were burned across the bands to the pipe itself. The exposed portions of the steel hangers were then protected against corrosion through the use of red lead paint.

These ten foot sections of 18 inch diameter pipe were then shipped in car-load lots to the location of the job. They were unloaded and placed at intervals along the steel frame work which had been erected on concrete foundations between the plants. The elevation of this frame work was approximately 40 feet high.

Each ten foot section of lead pipe was hoisted into place and fastened by steel rods which hung from the frame work and connected to the hangers. As the sections were swung into place and aligned, lead burners working along the top of the frame work burned them together perfectly so that a continuous unbroken length was achieved.

To take up the expansion in a line of this type an expansion loop approximately 11 feet in diameter was made of lead pipe and joined to the line itself. At each end of the line lead fans were installed. One of these lead fans served as a blower to push the gas through the line while the lead fan at the other end created suction which assisted the transport of the gas.

The illustrations show clearly how this pipe was formed from sheet lead and erected in place. The drawings show the detail of the hangers used in the lead line as well as the detail of the hangers used to support the expansion loop. The lead line if in a vertical position would be twice as high as the towering Empire State Building in New York City.

This installation is just one more instance where lead has played its invaluable part as a dependable servant to those who appreciate its usefulness and who have the ability to build from it successful and economical chemical equipment.

Industrial Catalysis

Industrial catalysis from the standpoint of both specific catalysts and specific catalytic reactions was reviewed at a session of the recent meeting of the Electrochemical Society in Philadelphia.

The important position of nickel as a catalyst was summarized by O. B. J. Fraser, International Nickel. A large proportion of the nickel used catalytically goes into industrial fat hardening operations, chiefly in the form of nickel sulfate, a by-product of copper refining somewhat below the standard of purity of commercial nickel salt as used for electroplating being satisfactory. Undesirable impurities may be removed during the conversion of the salt into finished metallic catalyst. Other important uses of nickel catalysts are in synthesis from hydrogen and oxides of carbon, hydrogenation of hydrocarbons, artificial aging of distilled liquors, dehydrogenation and polymerization of organic compounds, formation of hydrogen from hydrocarbon gases, esterification, hydration and dehydration, oxidation of fats and oils, miscellaneous organic reactions, and in a host of other catalytic processes.

Use of metallic oxides as catalysts in certain organic chemical processes was discussed by P. K. Frolich, Standard Oil Development Co. Little work was done on the use of oxide catalysts until after 1900, and the principal developments in this direction are of much more recent origin. It was the new high pressure technique, introduced with the development of synthetic ammonia, that eventually made it possible to take full advantage of the reducing power of the metallic oxide catalysts.

The formation of methane from carbon monoxide and hydrogen in the presence of nickel was known for some time before the use of oxides, notably those of zinc and chromium in combination, permitted the process to be operated with production of methanol to the practically complete exclusion of methane. If in this reaction a small amount of alkali is added to the catalyst, higher alcohols are produced along with the methanol, and, depending upon the exact conditions, there are also formed certain esters, acids and other oxygenated derivatives.

Oxides are also used in the production of ethers, aliphatic acids, ketones and aldehydes, reduction of organic compounds, and hydrocarbon synthesis. One of the most interesting and economically important applications of metallic oxides as catalysts is in the high-pressure hydrogenation of coal and petroleum.

The place of the halogens as catalysts was described by Hans Joachim Schumacher, Institut für Physikalische Chemie, University of Frankfurt. All four halogens are good catalysts for many reactions, and the mechanism involved may be interpreted from either a physical or chemical point of view. In some cases, it is the molecules of iodine, bromine, chlorine and fluorine that act as catalysts; in other reactions it is the halogen atom that is the catalyst. Practically all reactions of organic substances that are catalyzed by iodine can be interpreted chemically rather than physically. Bromine accelerates the decomposition of ozone by the formation of intermediate compounds (oxides). Relatively few thermal reactions involving chlorine as a catalyst have been investigated.

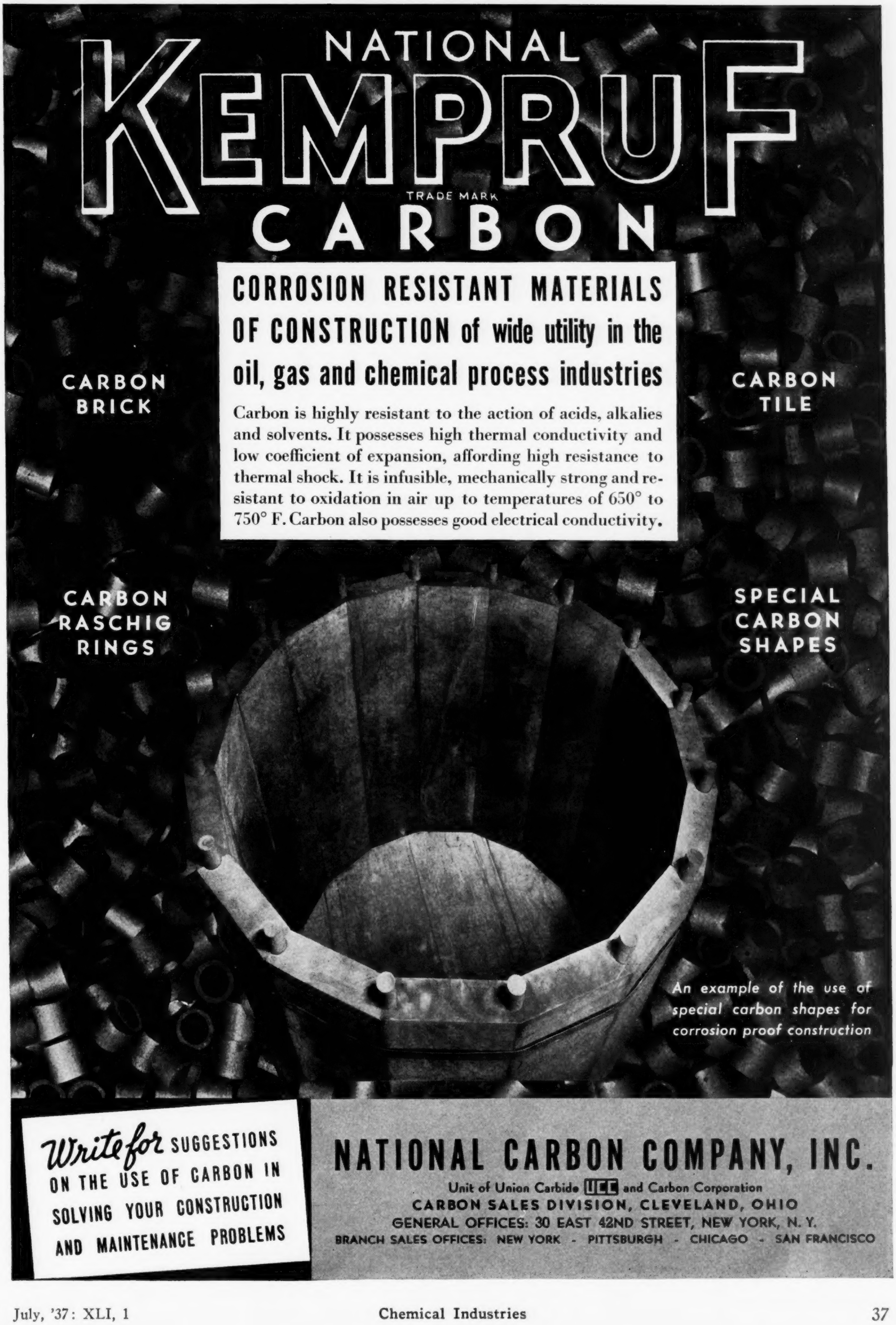
Rare Earth Catalysts

According to B. S. Hopkins and W. A. Taebal, the rare earths have been found to function as catalysts in three general types of reactions: oxidation or dehydrogenation, reduction or hydrogenation, and compound formation. They are not only effective alone but contribute to the activity, the resistance to fatigue and the length of life of other catalysts when used as promoters.

One of the first instances of the application of the catalytic effect of these compounds was in the Welsbach mantle. It was found that the luminosity from a mantle impregnated with pure thorium oxide was less than that of the impure material, and that about 1 per cent. ceria in the mixture was most efficient in increasing luminosity. Oxidation of benzene to phenol and of toluene to benzaldehyde and benzoic acid has been effectively accomplished with rare earth catalysts, but they are too active in the case of the lighter alcohols. The rare earths are also very active in the catalyzing of the oxidation of certain inorganic compounds such as sodium arsenite. The catalytic effect of the rare earths in oxidizing reactions is usually explained through the formation of intermediate compounds—peroxides which, in the presence of another oxidizable substance, transfer a portion of their acquired oxygen to the substance to be oxidized.

Cobalt is in many instances the best oxide catalyst. Colin G. Fink, Columbia University, briefly outlined the story of cobalt from its former position as a rare element to present comparatively large scale production from the copper ores of southern Africa and the silver ores of Temiskaming, Ont. The Cobalt Syndicate, a recently formed cartel, controls about 85 per cent. of the world's cobalt business, embracing the resources and producers of Belgium, Canada, Northern Rhodesia, Morocco and Germany.

Aqueous solutions of sodium and calcium hypochlorite are explosively decomposed when brought into contact with a trace of cobalt salts. This decomposition has suggested such applications as a rapid bleach or the production of pure oxygen. Cobalt oxide is the most efficient oxide catalyst for the oxida-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tion of ammonia, and cobalt metal has been effective in the decomposition of certain organic compounds. The anodic behavior of cobalt and of cobalt compounds has been investigated, and the superiority of insoluble cobalt alloy anodes over others is attributed to the ease with which cobalt will pass from a lower state of oxidation to a higher state and vice versa at relatively low temperatures and pressures.

Ammonia and Methanol Catalysts

Dealing with ammonia and methanol catalysts, Alfred T. Larson, du Pont, made some comparisons between the catalysts used for the two processes. Methanol catalysts are reactive at appreciably lower temperatures than ammonia catalysts. One of the earliest commercial catalysts for ammonia was iron, to which was added a small percentage of promoter, such as oxides of the alkaline earths. Ammonia is the only product of the interaction of hydrogen and nitrogen, but the products of the interaction of carbon monoxide and hydrogen are numerous, often depending upon the catalyst used. Thus, for example, a mixture of zinc oxide and aluminum oxide will produce dimethyl ether, and a mixture of zinc oxide and chromic oxide will confine the product to methanol over a wide range of temperatures. Sulfur has a serious poisonous effect on the iron catalysts for ammonia, but has no effect on the zinc oxide-chromic oxide catalyst for methanol. *Canadian Chemistry & Metallurgy*, June 1937, p. 221.

Hydrogen Peroxide Process

Use of anthraquinone derivatives in manufacture of hydrogen peroxide is proposed by I. G. in E.P. 465,070 of 1936. Hydrogen peroxide is known to be formed by the oxidation of many organic compounds which have hydrogen atoms which are comparatively readily split off with oxygen, but it has hitherto been thought that this oxidation only proceeds rapidly when the solution contains such an amount of alkali or alkaline earth that the hydrogen peroxide formed is completely bound thereto. It is also known that free hydrogen peroxide is formed by oxidation with elementary oxygen or gases containing the same in a non-alkaline medium, but under normal conditions in the cases hitherto known the speed of oxidation has been so small that side reactions come into prominence and the yield of hydrogen peroxide is extremely bad. To overcome this drawback, it has been proposed in experiments with hydrazobenzene to carry out the oxidation in a neutral medium under a high pressure of oxygen and to select a medium in which the hydrogen peroxide is insoluble so that it separates during the oxidation.

I. G. chemists have now found that a certain kind of substance may be oxidized extremely rapidly, readily and smoothly with elementary oxygen or gases containing the same, in a neutral medium or if desired in a slightly acid or slightly alkaline medium, with the simultaneous, practically quantitative, formation of hydrogen peroxide. The substances referred to are aromatic, preferably polynuclear compounds, which are converted by oxidation with elementary oxygen or gases containing the same into quinoid compounds, and also the substances obtainable by the reduction of indigoid compounds. For example, indigo white, and polynuclear, in particular substituted, hydroquinones which by oxidation form quinones or molecular compounds of the nature of quinhydrone are suitable.

When moderate concentrations of hydrogen peroxide are sufficient, it is preferable to extract the hydrogen peroxide formed with a solvent, as for example water, which is not miscible or only miscible to a limited extent with the organic solution during or after the oxidation. In this case there may be selected as the solvent for the preparation of the organic solution a liquid which is also not miscible with water and in which the hydrogen peroxide is soluble, *e.g.*, amyl alcohol, cyclohexanol, methylcyclohexanol and mixtures of the same with other solvents, such as benzene or xylene. The separation of the hydrogen peroxide may also be effected by distillation or freezing instead of by extraction.

The following examples are among those given in the specification:

Six grammes of 2-methylanthraquinone are dissolved in 100 cc. of benzene and 50 cc. of cyclohexanol and reduced by molecular hydrogen to 2-methylanthrahydroquinone at room temperature and at atmospheric pressure with the aid of a nickel catalyst. Solution is freed from nickel by filtration and shaken with oxygen at atmospheric pressure, whereby in the course of about one minute 600 cc. of oxygen are absorbed. After oxidation, the hydrogen peroxide is shaken out from the solution with water. About 0.8 gramme of hydrogen peroxide passes into the water, *i. e.*, more than 90% of the theoretical amount calculated on the oxygen. After separating the aqueous layer, the quinone solution may be again subjected to reduction.

3.6 grammes of 1-chloranthraquinone are dissolved in 100 cc. of benzene and shaken for about fifteen minutes with a solution of sodium hydrosulfite under an atmosphere of nitrogen. After separating and washing with water, the benzene solution is shaken in presence of water with oxygen at atmospheric pressure. From about 80 to 100 cc. of oxygen are absorbed in a few seconds and reappear in the aqueous layer as hydrogen peroxide in a yield of about 90 per cent. Process may be repeated as frequently as desired. *Chemical Trade Journal,* June 11, 1937, p. 516.

Caustic Soda Production

Alkali metal hydroxides are obtained by making a mash of an alkali metal chloride such as rock salt with a quantity of water insufficient to dissolve it, treating the mash with a concentrated non-gaseous hydrofluoric acid containing more than 40 per cent. HF, and treating the alkali metal fluoride obtained with lime to obtain caustic alkali and calcium fluoride. Hydrochloric acid is also obtained. Excess of hydrofluorics is preferably employed. The calcium fluoride may be treated with sulfuric acid to obtain hydrofluoric acid for use in the process. E. P. 461,597.

Acetate Film Process

K. Werner, of Mainz-Mombach, has patented a new process for triacetylcellulose. A sufficiently stable triacetylcellulose with about 0.02 per cent. chemically combined sulfuric acid is prepared in the so-called large-space reaction apparatus. This acetic acid solution of triacetylcellulose can then be used directly—that is, without intermediate precipitation, etc.—to produce some finished products such as foils or artificial silk. Beautiful, clear, transparent foils and films suitable for the packaging and electrical industries can be prepared without softening agents. The permeability of the films for liquid water is practically zero. *Ind. & Eng. Chem.* (news edit.), May 10, 1937.

New Polyphosphates of Soda

Anhydrous sodium tri-polyphosphate, $Na_5P_3O_{10}$, can be obtained by the fusion and calcination of mixtures of sodium metaphosphate and sodium pyrophosphate. For the isolation of the sodium polyphosphate the mass must be cooled, and then further heated for a time at a temperature just below its solidification point. Conversion is stated to be complete, and it is possible, by taking up the melt with water, to crystallize out $Na_5P_3O_{10}.6H_2O$. The existence of higher condensed polyphosphates has also been deduced from these investigations. Hans Huler in *Angewandte Chemie*, May 1937.

Gas Free from CO

A new process for making gas free from carbon monoxide is described by Dr. Oskar Zahn, in *Chemiker Zeitung*, April 7, '37, p. 298. Such a process, states the author, (1) should reduce the carbon monoxide to one per cent. maximum; (2) make no increase in the carbon dioxide content; (3) allow the use of a contact material which is cheap and of which the activity can be regenerated; and (4) demand but little heat consumption, steam requirements for the conversion of the carbon monoxide being covered by the exothermic effect and otherwise waste heat as far as possible. These conditions are fulfilled by new process known as the Boscoseur-Marishka method of freeing gases of carbon monoxide, and in which the conversion of the carbon monoxide to carbon dioxide and the removal of the latter by absorption are accomplished simultaneously, without impairing the heat value of the gas under treatment.

Experiments by W. J. Müller and E. Grat with this process are described in *Gas u. Wasserfach*, 1934, page 77, and 1936, page 14. Considerable changes in the specific gravity and ignitibility of the gas have no unfavorable action on the combustion of the treated gas, and no change in the combustion apparatus is required. The heating value of the gas after treatment by the process is increased somewhat by the increase in the hydrogen proportion.

Conversion of the carbon monoxide to carbon dioxide in the process is made by steam in the presence of a catalyst, according to the equation $CO + H_2O = CO_2 + H_2$ but differs from other processes employing this reaction in that the carbon dioxide is absorbed as formed by the contact material in the same space as the conversion. The catalyst is freed from absorbed carbon dioxide and regenerated into the active condition in a regenerator furnace, heated by using the cheapest available local fuel, and is cooled down sufficiently to again take over the double function of catalyst and absorbent; the action of the process is, therefore, of a cyclic character. As a natural contact material, the mineral ankerite is suitable; this mineral contains iron, lime and magnesia in the form of carbonates. Either the natural mineral, or a mixture artificially produced from the same, can be used. Besides the double action mentioned, this contact material also absorbs organic sulfur compounds in the gas, thus eliminating the necessity of a special treatment for the removal of these and hydrogen sulfide.

The greater part of the conversion of the carbon monoxide takes place in a single treatment of the gas as described, but if complete conversion, or a 99 per cent. and upwards conversion is desired, the gases are passed through a side contact furnace to reduce the carbon monoxide content down to one per cent. as a maximum. Whether or not the last traces of carbon monoxide are removed depends upon the local requirements in this respect. In this side contact furnace, it is necessary to regenerate the contact material only at long intervals.

After utilizing the sensible heat in the treated gas to produce saturated steam and hot water, the gases are conducted in a final cooler and their temperature reduced to about 20° C. The steam leaving the contact furnace at 12—15 atmospheres pressure is used to drive a turbine which is employed to produce electric energy; the excess exothermic and other unutilized heat in the process can be used to produce steam, or in any other way desired.

Process is suitable for removal of carbon monoxide from any gas mixture containing it, whether the composition be comparatively simple or rather complex, and, therefore, for all kinds of town gas. It is well suited also for producing synthesis gas for the Fischer-Tropsch hydrocarbon synthesis from water gas, by bringing the proportions of carbon monoxide and hydrogen into the ratio 1:2. In this case a partial conversion only of the carbon monoxide is effected and removed as carbon dioxide, so that a gas mixture in suitable proportions for the synthesis is obtained. This can be carried out in the same plants as those used for the complete conversion. The principal part of the plant is in the open-air, but a small building is required for the mechanical, electrical, and control operations. The plant is operated by one man on each shift; the service of a second man is required only in large plants handling from 3,000 to 5,000 cubic meters of gas hourly. Plants for large performance are arranged in battery form, that is, with several contact furnaces and several regenerators, and the operation is semi-automatic. The starting up of the plant is simple and requires only a few hours.

This process has many advantages. It is applicable to any carbon monoxide-containing gases, or mixtures of such gases. It allows the simultaneous conversion of carbon monoxide to carbon dioxide and absorption of the latter to any desired degree. There is smaller steam consumption through utilizing the exothermic effect of the conversion, and also the utilization of the surplus of such heat in the production of electric energy. The contact material is cheap and the consumption of it is small. Process is simple, quick, and safe in operation, it is early adaptable to changes in operation and to different gases or mixtures of gases; needs no extra production of coal gas than in normal coal gas production; and involves no increase in the coke production. It removes organic sulfur compounds from the gas mixture and avoids the after-purification from hydrogen sulfide, and also gives selective employment possibilities for making gas mixtures non-poisonous or of producing synthesis gas.

By-Product Silica in New Market

Silica is the principal constituent of glass. A new outlet for byproduct silica is anticipated due to the expanding market for glass products in industry and for construction. A china clay company in North Carolina recently has shipped byproduct silica to a glass-block factory. Feldspar producers are giving thought to the possibility of thus utilizing the large quantities of quartz that occur with feldspar in pegmatite dikes. A larger market for byproduct quartz would give impetus to the development of froth flotation processes for separating feldspar from quartz and thus encourage the exploitation of low-grade feldspar deposits.

Reactions with Activated Alumina

Drs. R. S. Cahn and R. F. Phipers report that commercial 'activated' aluminas contain relatively large amounts of absorbed alkali and can bring about, in neutral solvents, reactions normally associated with alkaline reagents in hydroxylic solvents. They suggest that the alkalinity may be responsible for abnormal results recorded by other workers. *Nature,* p717, 24 Apr. '37.

Vanillin from Sulfite Lye

Manufacture of vanillin from waste sulfite pulp liquor is described by H. Hibbert, Montreal, and G. H. Tomlinson, Quebec, in E.P. 465,708 of 1936. In process the vanillin is initially formed by the action of hot alkali on the lignin sulfonic acids; liberated from its alkaline solution by carbon dioxide; and isolated by extraction with a suitable solvent. The vanillin is separated from the solvent and purified by well-known methods. The waste alkali contained in the mother liquor is recoverable. In practice the initial formation of vanillin may be accomplished by evaporating the waste liquor to a suitable concentration, and then heating it in the presence of an excess of sodium hydroxide. Mixture may be heated to boiling at atmospheric pressure or to around 125° C. to 160° C. under superatmospheric pressure. The vanillin is liberated by treatment of the alkaline reaction liquor with an excess of carbon dioxide, and is isolated by extraction with a suitable solvent such as benzene or ethylene chloride. The residual liquor is treated to remove the insoluble calcium salts, and then dried and incinerated to recover sodium carbonate which is causticized for re-use in the process.

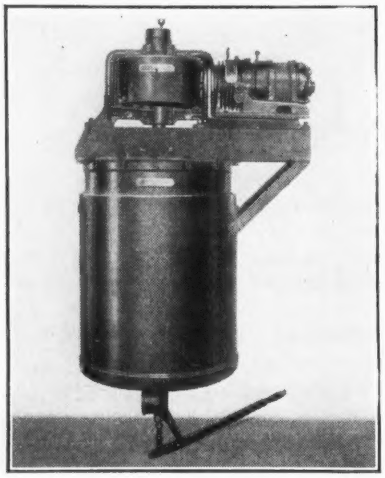
New Equipment

Electromode Industrial Heater

A new Electromode Industrial Heater (Model IBN) is announced by Electric Air Heater Co., Division American Foundry Equipment Co., 555 South Byrkit st., Mishawaka, Ind. Many completely new features are used in the design of this heater, such as the single, cast, circular grid; a cast aluminum fan housing, and a stronger housing construction. A motor driven, four-bladed aluminum fan, running on a graphite impregnated bronze bushing for quiet operation, dissipates heat from the entire surface of the circular grid and circulates the warm air. Heat can be directed wherever it is needed by moving a series of adjustable deflectors mounted on the front of the unit.

Grease and Soap Kettles

A line of motor and belt driven grease and soap kettles suitable for the manufacture of all kinds of vegetable animal and mineral oil products and for other process work is being marketed by Patterson Foundry & Machine Co., East Liverpool, O. Entire line is built in both plain and stainless steel, as well as aluminum, Monel and other metals. Kettles are supplied with double motion drives so that the stirrers revolve in opposite directions. The outer stirrer is usually of the scraping type so that the sides of the kettle may be kept perfectly clean and thus promote rapid heat transfer. This line is being built in standard sizes from 50 to 2,000 gals. gross capacity.



Improved High Temperature Bonding Mortar

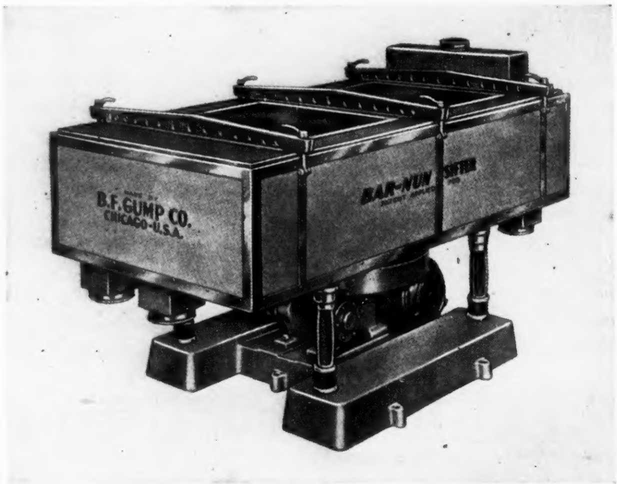
Further improvement has been made in the refractoriness and working quality of Harwaco Bond, high temperature bonding mortar for use in industrial furnace masonry, product of Harbison-Walker Refractories, Pittsburgh. Improved product has a Pyrometric Cone Equivalent of Cone 32 (3092° F.). Use of this diaspore-base bonding mortar in place of mortar consisting essentially of fireclay is becoming increasingly general for laying fireclay, super-duty fireclay, and high-alumina brick where a strong bond must be maintained at the upper limits of industrial furnace operating temperatures.

Rubber Linings for Steel Pipes

Economics running into thousands of dollars annually for the U. S. steel industry are expected to result from development by Goodrich engineers of a special 3-ply rubber lining and flexible couplings for steel pipes used in the disposal of hot acid in strip mill pickling operations which easily withstands thermal shock of acid ranging in temperature up to 200° when it is flushed from the pickling tanks. New pipe lining and joints prevent disposal conduits from cracking.

Rotary Sifters

The Bar-Nun Sifter, a rotary motion sifting unit, is announced by B. F. Gump Co., 523 S. Clinton st., Chicago. Designed principally for sifting and rebolting flour and other powders, these sturdy, compact units can also be used to advantage for scalping, grading and separating many kinds of dry and granulated materials. The mechanically controlled, complete rotary motion of the entire sieve area produces exceptionally large capacity per square foot of silk or wire bolting cloth. A complete separation of tailings and finished product is obtained on each individual sieve; and other features include easy accessibility for cleaning and interchangeable sieves for accommodating various conditions for grading or sifting. Sifters are driven by a fractional horsepower motor and can be furnished with either 1, 2 or 3 sieves deep for sifting and rebolting, and from 2 to 5 sieves for separating or grading work. Screen areas furnished are 20″ x 30″, 30″ x 50″ and 40″ x 60″. Approximate height overall is 3½ feet.



Liquid Level Control

An adjustable liquor level control, adaptable to existing equipment in the way of evaporators, reboilers and particularly useful on other equipment where the liquor level tends to surge or periodically rise and fall, has been developed by Evaporator Division, Struthers-Wells, Titusville, Pa.

Strip Heater and Busbar

A recent addition to General Electric's line of small heating units is a "strip" heater with offset terminals, construction of which greatly facilitates wiring and arrangement of strip heaters in series. New units are available in convenient lengths and ratings. A busbar has been developed for use with this new unit.

Gas Tight Goggles Eliminate Fog

For workers who come in contact with chemical fumes, gases, steam, etc., gas-tight rubber goggles, which eliminate fogging without necessity of removal, have been produced by H. S. Cover, So. Bend, Ind. Goggles fit face so snugly that outside air cannot penetrate to the eyes.

Bag Weighing Machine

Syntron Co., Homer City, Pa., is marketing a new bag or sack filling machine designed around their Vibra-Flow, Feeders, which has a capacity of up to 100 lb. bags. Extreme accuracy coupled with reasonable operating speed are the outstanding advantages. A Vibratory Packer is another piece of equipment.

Power Mixer

A power mixer recently introduced by Laboratory Equipment Co. provides finger tip control for its hundreds of different speeds. It incorporates the very latest mechanical and electrical developments, including special silent reduction gears of fabric base Bakelite laminated for the rheostat knob and special fuse housing.

Booklets & Catalogs

Companies whose booklets are reviewed on this page will be glad to supply readers of "Chemical Industries" with copies free, provided this magazine is mentioned and the request is made on company stationery. Your business title should also be given.

Chemical

Coatings Booklets: Blue Knight Blax, chip-proof colored flexible lacquer enamel, samples supplied for testing; **Blue Knight Taupe 978A,** no-finger print finish, pigmented enamel; **Blue Knight Leaflex No. 5900,** extra smooth leafing aluminum finish, samples supplied for testing. Roxalin Flexible Lacquer Co., Elizabeth, N. J.

Colloid Collaborator, Issue A, Technical Information Bulletins, features article on "Monoglycerides in Cosmetics." Colloid Chemical Labs., 92 Liberty St., N. Y. City.

Fourth Annual Report, American Petroleum Industries Committee, concise summary of activities during 1936, and general developments in industry. American Petroleum Industries Committee, 50 W. 50th st., N. Y. City.

Fertilizer Prices and Price Indexes, annual figures as far back as 1880, with tables and charts. Prepared by National Fertilizer Ass'n, 616 Investment Bldg., Washington, D. C.

Laux re-Plys, Vol. 1, No. 1, July 1937, house organ for plywood people, makes auspicious debut; company's specialties well publicized. I. F. Laucks, Inc., Seattle, Wash.

Penchlor Asplit Cement (Pamphlet No. 3), a self-hardening acid-proof cement of unusual strength and toughness. Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Phila., Pa.

Plastics, Vol. 1, No. 1, June 1937, new English monthly dealing with plastic materials; attractively illustrated, and promises a wealth of valuable information. M. D. Curwen is editor. Published by Temple Press, Ltd., 5-17 Rosebery ave., London, E.C. 1, England. American subscription price 15s post free, for one year.

Silicates:—Standard Silicate Division, Diamond Alkali Co., Koppers Bldg., Pittsburgh, has issued following booklets: **Standard Silicate Alkalies,** covering silicate of soda and silicated alkalies; **Standard Sodium Metasilicate,** for general laundry use; **Alkalate,** for discriminating laundries; **Standard Supersilicate,** for laundries having average soil and medium bicarbonate water conditions; **Standard Sodium Orthosilicate,** for laundries having high bicarbonate water and heavy soil.

Synthetic Organic Chemicals, 1937 edition, 78 page brochure, interesting and useful industrial references on specifications, properties, and uses of over eighty aliphatic organic chemicals. Much information to be obtained from no other source *gratis* from Carbide & Carbon Chemicals Corp., Dept. B, 30 E. 42nd st., N. Y. City.

Zin-O-Lyte, brochure completely describes this method of brilliant zinc plating developed by Grasselli Chemicals Dept., du Pont, Wilmington.

Equipment, Apparatus

Clay and Mineral Working Plants, Catalog No. 371, heavily illustrated, with specifications and descriptive data of equipment available in these fields. Patterson Foundry & Machine Co., East Liverpool, O.

Corrosion Resisting Equipment, brochure besides listing equipment in many cases gives complete data as to sizes, capacities, dimensions and engineering. Duriron Co., Dayton, O.

Darcograph, booklet, member of set which includes scale rule and graph sheets, describes accurate method of evaluating activated decolorizing carbon. Present booklet limited to water purification but later issue will deal with all liquids. Darco Corp., 60 E. 42nd st., N. Y. City.

Detachable Instruments for outdoor and indoor service. Catalog Section 43-600 lists prices, includes outside dimensions, application data, and construction details. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Gas Fired Air Heaters designed for any type of industrial installation, for drying and annealing purposes, low or high temperatures described in Form No. Sc-70. Surface Combustion Corp., Toledo, Ohio.

How to Run a Lathe, 53rd edition of well known machinists' manual, handy reference for all engaged in metal working operations. South Bend Lathe Works, So. Bend, Ind.

Industrial Dermatitis, booklet, "Protection at Point of Production," describes hazards and lists Ply Protective products for prevention. Milburn Co., 905 Henry st., Detroit, Mich.

Inhalator, leaflet "Pulmosan B-K Inhalator," details of construction and operation. Pulmosan Safety Equipment Corp., 176 Johnson st., Brooklyn N. Y.

J-M Bonded Built-Up Roofs, 36 pp. of detailed specifications on company's line, various methods of base and cap flashing, together with diagrams which show how flashing should be installed. Johns-Manville, 22 E 40th st., N. Y. City.

Method of Integrally-casting end rings, fans and rotor bars of alternating current squirrel-cage induction motors; whereby possibility of bad contacts or loose connections is eliminated. Reliance Electric & Engineering Co., 1088 Ivanhoe rd., Cleveland, O.

Motorpump Condensate Return Units, Bulletin 1972-B illustrates Cameron unit, shows many applications, and data on sizes and capacities. Ingersoll-Rand Co., 11 Broadway N. Y. City.

Multiple-Orifice Flow Meter of the U-tube type suitable for measuring a wide range of flow-rates at pressures from 200-600 lbs. per sq. in., Bulletin No. 5. Meriam Co., 1955 W. 112th st., Cleveland, O.

Pyrometer Controllers, 12 p. bulletin on Round Chart Potentiometer Pyrometers available as temperature recorders and controllers, both pneumatic and electrically operating types. Bristol Co., Waterbury, Conn.

Rockwood Dualsteel Union, leaflet describes this temper carbon steel used for first time in production of a heavy duty steel union also fields to which it is adaptable. Rockwood Sprinkler Co., 38 Harlow st., Worcester, Mass.

Rod Straightener, Bulletin 10 on American Rod Straightener and Shear Machine features models, operations, and installations. American Foundry Equipment Co., Mishawaka, Ind.

Rotary Pumps, Bulletin 61-B10 lists new-type RF 3-lobe cycloid I pump particularly adapted to handling heavier liquids such as tar, etc. Table of capacities is given. Bulletin 55-B10 covers application of certain units as exhausters for priming the larger centrifugal pumps. Roots-Connersville Blower Corp., Connersville, Ind.

Sewage Sludge Gas Engines, Bulletin S-550-B13, lists Worthington products and views of installations. Worthington Pump & Machinery Corp., Harrison, N. J.

Skid Platforms, Circular No. 146 illustrates types that may be used in conveying materials, merchandise, etc., by the Lift Truck method of interior transportation. Lewis-Shepard Co., 175 Walnut st., Watertown, Mass.

Therhumiter, descriptive bulletin available on Bailey-Parsons effective temperature indicator. Results can be read directly from instrument without reference to any chart or index. John R. Parsons, 151 E. 19th st., N. Y. City.

To Improve Corrective Water Treatment, 20 page bulletin adequately describes and illustrates Micromax automatic pH recording or controlling equipment. Leeds & Northrup Co., 4934 Stenton ave., Phila., Pa.

Equipment News

A Pittsburgh office has been opened by Patterson Foundry & Machine in the Bessemer Bldg., with D. M. Wilhelm in charge. An engineering department will be maintained at this office as well as a district purchasing department.

Syntron to Larger Headquarters

To keep pace with increased production Syntron Co. has moved their factory and offices from Pittsburgh to larger facilities at Homer City, Pa.

Appointments

Buffalo Scale Co., Buffalo, has assigned E. J. Kelly to distribute their line in Missouri and Southern Illinois.

Loeffler-Greene Supply, Oklahoma City, has been appointed local distributor for the line of controls manufactured by Mercoid Corp., Chicago.

Roger Bolin has been named merchandising advertising manager of Westinghouse, succeeding S. D. Mahan who was made general advertising manager.

J. B. Trotman, manager Turbine Pump division, Roots-Connersville Blower Corp., Connersville, Ind., announces recent appointments of zone representatives, as follows:

Carl B. Sunderland, Muncie, Ind., covering states of Ind., Ohio, Mich., Ill., and Ky.; J. J. Heinrikson, Kansas City, Mo., covering western part of Mo., state of Kansas, most of Nebraska, and southwestern quarter of Ia.; Paul C. Rowe, Newark, N. J., covering northern half of that state.

Crane Consolidates Departments

P. R. Mork, v. p. in charge sales, Crane Co., Chicago, announces the co-ordination of all activities concerned with the estimating, engineering, or sales of valves, fittings, pipe, and fabricated piping into one unit, the Valve and Fitting Department, with W. H. Pape as manager.

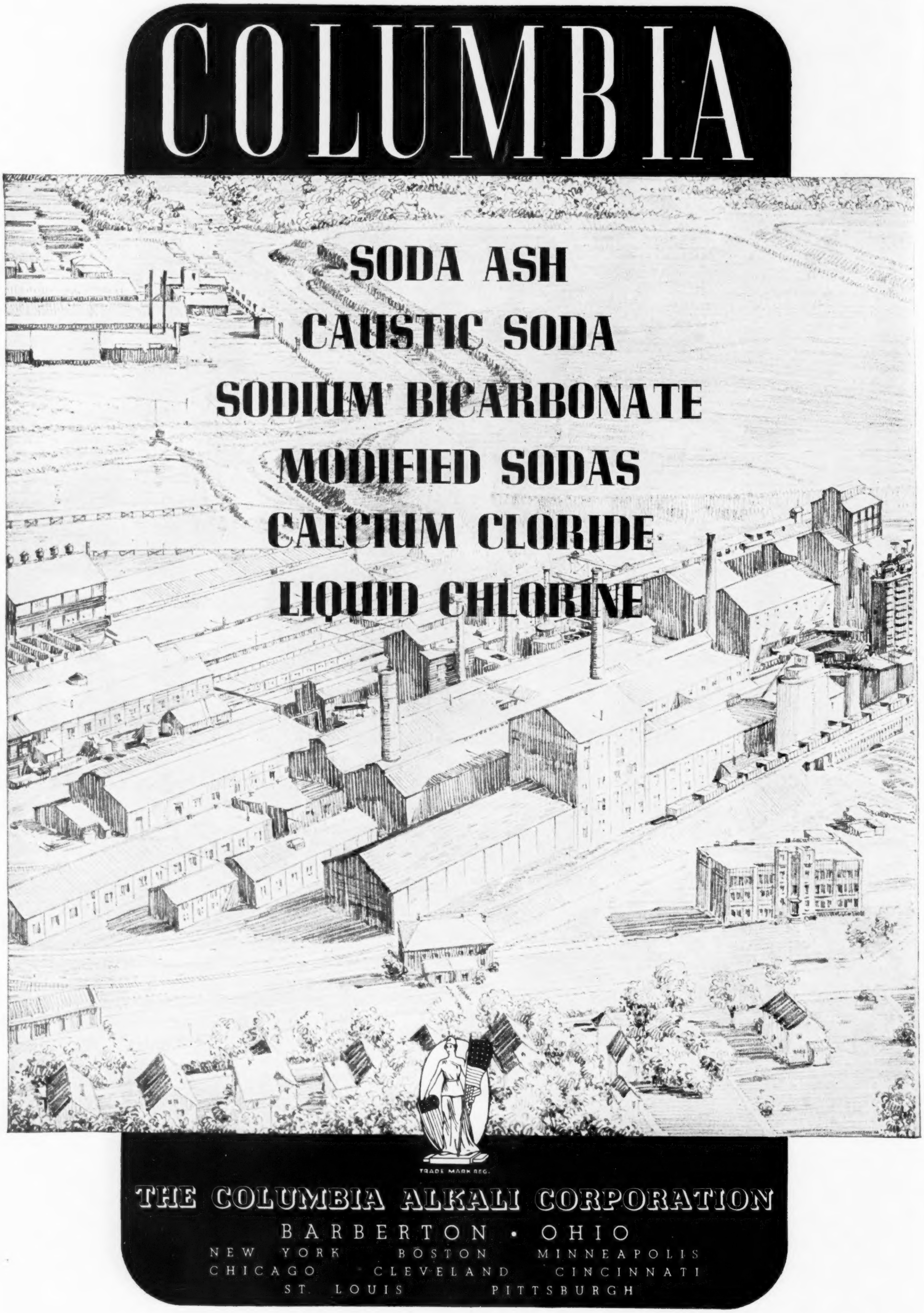
The Industrial Sales and Engineering Sales Departments are consolidated into the Engineering Sales Section of the Valve and Fitting Department with E. Burke, manager. J. H. Barker is manager of the Sales Quotation Section of the Valve and Fitting Department.

Haynes Expands

Construction of a two story fireproof office building at the plant in Kokomo, Ind., to provide for growing business is contemplated by Haynes Stellite Co.

First U. S. "Water Smeller"

The first "water smeller" in the U. S. to receive an appointment in that capacity is Henry Laughlin of Tyrone, Pa., who has been named to fill this newly created post by Industrial Chemical Sales Division, West Virginia Pulp and Paper Co., makers of activated carbon widely used to remove tastes and odors from municipal water supplies. Mr. Laughlin will travel extensively and test the odoriferous qualities of the raw water of many principal American cities.


COLUMBIA
SODA ASH
CAUSTIC SODA
SODIUM BICARBONATE
MODIFIED SODAS
CALCIUM CLORIDE
LIQUID CHLORINE
TRADE MARK REG.
THE COLUMBIA ALKALI CORPORATION
BARBERTON • OHIO
NEW YORK BOSTON MINNEAPOLIS
CHICAGO CLEVELAND CINCINNATI
ST. LOUIS PITTSBURGH

Chemurgic Progress Reports

Abstracts of Papers of Particular Chemical Significance

AT the Third Farm Chemurgic Council meeting in Detroit and Dearborn, May 25 to 27, 1937, the program centered naturally upon agricultural and sociological aspects of the chemurgic movement but the following papers made direct contributions to the chemical and economic problems of the greater use in this industry of various farm grown raw materials.

Celloveil

By Dr. William J. Hale
Research Consultant, Dow Chemical Co.

OUR fruit and nut trees have suffered much through unseasonable climatic conditions and attacks by insects. The study and application of insecticides has remedied somewhat the latter, but little short of nothing has so far been accomplished toward driving off Jack Frost in spite of extensive resort to old-fashioned smudge pots which, at best, are unreliable and filthy.

As human society is favored through chemical research with a greater and greater variety in its habiliments and our ladies' gowns portray today an orgy in gorgeous texture and hue, so at long last our arboreal society is to be made to enjoy the fruits of man's chemical labor. In both do we lay primary emphasis upon cellulosic material. Whereas in the former we belittle expense in the pursuit of comfort and search for style and satisfaction of vanity,—in the latter we save expense and disregard style in the ultimate aim to be of service to man.

We now proclaim that fruit and nut trees are soon to be clothed in our ladies' garments; which by comparison we may describe as in blouse and skirt. But unlike the blouse of socially prominent, the arboreal blouse will encompass the head and shoulders. In brief we find this arboreal garment set upon the top of tree as a mantle and from the rim of the mantle falls a skirt which as with ladies of old may trail on the soft luxurious carpet of nature, or like to the athletic form may be gathered about the trunk of tree. The particular point of variance in this tree attire lies in the perforations or net-work of the skirt and more or less continuous surface of the mantle. Thus the orchard costume becomes the reverse of the ballroom costume.

Cellulosic material will preferably make up the composition of the garment by reason of its permeability to light and thereby permit of normal photosynthetic reactions within leaf and fruit. The perforations in skirt will permit of free access of air and in many places to free access of bees but not of moth. Thus marked protection against unfriendly insects will be secured.

Upon report of threatened cold a gentle application of selective spray suffices to film over the interstices of Celloveil; which film will persist for several days at least and bring the temperature within Celloveil some five to twenty degrees higher than the atmospheric mean. In this wise danger of freezing is avoided and the buds or blossoms remain perfect. In selected order the film disappears and the respiration of tree is restored to normal.

The rapid strides in cellulosic research have made this Celloveil a practical garment. Composed preferably of ethyl cellulose or cellulose acetate, it is in itself weather resistant. But the all decisive factor lies in the cost of such garment. In weight a Celloveil for a single peach tree will not bring over 10 cents in selling price. But far more important is the fact that everything of this Celloveil will have its origin in agricultural raw materials. Truly then as modern man has become accustomed to wearing less and less in weight of protective covering, the modern tree will take on a protective covering. So the farmer will have restored to him a portion of that which slowly has been slipping away,—an outlet for raiment.

But the coarse raiment output of the farm is never to return. It is in the new cellulosic compounds derivable from cotton and wood that we must look for future developments. Chemistry dictates an ever widening diversification in these compounds and Chemurgy offers to the farmer a greater and greater means of attaining these outlets. It shall become therefore the guiding principle of agriculture in a modern world to grow in abundance that which industry can utilize. In a scientifically established nation it is a chemical axiom that when industry makes full use of agricultural material never can the farmer oversupply industry.

The Fatty Oils

By Williams Haynes
Publisher of "Chemical Industries"

BY far the greatest single consumption of vegetable oils is as food. We eat virtually a third of all the oils and fats that we produce or import. Two very ancient industrial uses—in soap and in paint—still lead the factory consumption of oils, and it is upon the physical and chemical characteristics that fits any oil for these two uses that we base its commercial classification. Its particular adaptability to the saponification process or the quickness which it dries to form a smooth, firm film are any oil's chief claim to industrial fame.

The great edible oils are olive and cotton-seed. The favorites of the soap maker are palm and cocoanut; but they use even greater quantities of animal grease, tallow, and fish oils. In paint-making linseed heads all other oils, followed by tung, perilla and soy bean.

One important point to be borne always in mind is that almost all oils compete with each other for two, and sometimes for many, industrial uses. Their employment in industry at any given time depends upon comparative price balanced against adaptability for any given purpose. Neither must we forget that this inter-industry competition of the oils extends to competition also as foodstuffs with butter and lard, important fellow-farm products. The greatest American oil crop is cotton-seed—over one billion pounds worth more than 200 million dollars; and 918 million pounds went into "vegetable shortening," 108 million pounds into margarine, and 178 million pounds into other edible products, chiefly salad oil. This foodstuff consumption, not only of cotton-seed but also of peanut and of soy bean oils, is mounting rapidly. In the past ten years the pounds of cotton-seed oil used in margarine have grown from 23 to 108 million. In the housewives' market the determining factor is also price balanced against adaptability. The inter-changeability of the various oils is a complex and delicate problem that must always be scrupulously weighed.

Chemurgic developments of the past twelvemonth have centered chiefly around three oils: tung, soya bean, and perilla.

The two former have now definitely established themselves in this country as commercial crops produced in sufficient quantity to meet the test of price recognition in industrial markets.

American tung oil production this year will reach two million pounds from the 1936 crop—a notable increase from the 400,000 pounds produced two years ago. I have these figures from Mr. Concannon, Chief of the Chemical Division of the Department of Commerce, who I consider the country's foremost authority on the commercial aspects of this oil. He believes this year's crop will yield a million pounds of oil, a decrease due to unfavorable winter growing conditions and late frosts. Approximately 100,000 acres are now planted to tung trees. A third of this land is in Mississippi, half as much in Florida, with Georgia, Louisiana, Alabama and Texas following in the order named. Land gambling in tung plantations, reminiscent of the unsavory speculation that accompanied the first of the Florida orange groves twenty years ago, has appeared and even as much as 25% of the acreage reported is said to be in this doubtful class. Fortunately, this evil is recognized and is being fought. During the year, to the tung oil mills at Gainesville, Florida, and Bogalusa, Louisiana, have been added mills at Cairo, Georgia, and Picayune, Mississippi, with a capacity of 20 tons each a day of dry fruit.

Our industrial consumption of tung oil in the coatings industries continues to rise. Over 119 million pounds at an average price of about 15c represents last year's market of roughly 17½ million dollars. This price was high. At ten cents or thereabouts consumption would be stimulated, and I agree with Lamont Rowlands that a price not greater than 8c with vastly larger use is—or should be—the goal of our tung planters.

Soya bean oil shares with power alcohol the spotlight of public attention in chemurgic activities. Last year, the crop was cut down markedly, due to low prices the year before and to the action of the U. S. Department of Agriculture, which seemed unfair to many authorities, in classifying the bean as a soil-depleting crop. This year, however, planting is at the previous high record and under favorable growing conditions some 40 million bushels are expected at harvest.

Prior to 1934, half the soya bean oil went into paint manufacture and only 25 per cent. into foodstuffs. Now over 75 per cent. goes into the edible field, chiefly in margarine, and although paint factory consumption has increased, it now represents only 17 per cent. of the total. There are indications, however, that this switch will be reversed.

Here perilla oil steps into the picture. This oil is produced from the tiny seeds of a plant of the mint family. It is a slow maturing annual which needs a long growing season, so that it presents another chemurgic opportunity for the Southern states and again, an opportunity that cries aloud for Yankee invention to perfect a harvesting machine. From a few thousand pounds two years ago, our imports from Japan will exceed 150 million pounds in 1937. These two oils from Manchuria, perilla and soy bean, form an extremely useful partnership in paint and varnish making. Their most desirable characteristics blend, namely, the cheapness, the light color, and fine film of soya bean oil with the quick drying, quick bodying action of perilla oil. The whole development is a pretty example of the alertness of an oil consuming industry to adjust its processes to an advantageous change in materials.

Two new oils loom up on the chemurgic horizon. The first is chia from Mexico. The second is a by-product from pine wood.

Chia oil is very like perilla. The plant is an annual cultivated in Mexico. It has a growing season of only three months and is said to be extremely prolific. The seeds are eaten by the natives and the oil is highly favored by Mexican painters. Fifteen years ago, Dr. H. A. Gardner, brought in seed for experimental plantings which were conspicuously unsuccessful. But in 1925, he crushed 300 pounds of seed and critically examined the oil from the point of view of its usefulness in paint technology. He found a better color than linseed and better drying qualities than perilla. Since he had much to do with the rapid, successful introduction of perilla, it is significant that Dr. Gardner is in Mexico exploring the chia oil situation.

Oil from pine wood has been known in Europe many years. The increased use of pine for the manufacture of paper and cellulose for synthetic fibres in this country creates an opportunity for the development of this oil as a by-product. After the pine chips are digested, the solution is drawn off in order to recover the chemicals used. The first step is evaporation and on the top of the boiling liquors appears a scum in which is suspended a crude soap. Many efforts have been made to refine this soap, but it has been found most practical to convert it into free fatty acids. The resulting oil known as tall oil (from the Scandinavian "talloel") is being recovered and refined at the big kraft paper mill at Bogalusa.

This pine wood oil is an interesting material. Particularly so to the soap makers, since they can incorporate up to 20 per cent. in bar soap and larger quantities in liquid soap. In Europe many soap pastes made wholly from tall oil have long been on the market. Tall oil is an exceptionally good emulsifying agent. It is used also as a rubber softening agent and as a sizing agent for paper. Tall oil may be sulfonated and in this form used as cutting oils and in a mineral flotation. Blended with other oils, it becomes a linseed oil substitute, and combined with polyhydric alcohols, it produces a new series of synthetic resins. Obviously, this tall oil, produced as a by-product, if available in quantity, ought to have no difficulty in finding markets. It promises another most valuable stage to the pine tree utilization in the deep South that owes so much to Dr. Herty's work. Thus we see how one new chemical performance almost at once promises a second development.

May I, in conclusion, set up before you a target at which to fire some carefully aimed chemurgic shots. Since the close of the World War our population has increased roughly 25 per cent. During the same period our consumption of fatty oil has increased more than 100 per cent. We are producing less than half our requirements for these oils and we are this very year going to pay out to foreign oil producers over 112 million American dollars.

Raw Materials for Agrol

By Dr. Harry Miller

Chemical Foundation of Kansas Company

ALCOHOL is derived from either sugar or substances that can be converted into sugar. Theoretically sugar should yield 51.1 per cent. alcohol and 48.9 per cent. carbon dioxide by weight. In practice the alcohol plant is satisfied when 46 per cent. of the weight of the sugar appears as alcohol. On this basis a hundred pounds of sugar will yield 7.3 gallons of anhydrous ethyl alcohol.

Most alcohol raw materials contain starch rather than sugar. Starch is readily convertible into sugar and it gains weight in so doing, through the addition of water. One hundred pounds of starch take on 11 pounds of water to form 111 pounds of sugar. This conversion is usually brought about by cooking the starch material and then treating with extract from sprouted rye or barley. This process is referred to as saccharification. With perfect saccharification 100 lbs. of starch should yield 8.03 gallons of anhydrous ethyl alcohol. Perfect saccharification is seldom achieved, but a greater yield of alcohol is expected from starch than from the same weight of sugar. To do this we must know the peculiarities of the raw material used and control the saccharification process accordingly.

These peculiarities are caused by the materials associated with the starch and by its physical structure. Part of our work at Atchison has been to determine these peculiarities and how best to handle them. For example corn, some of the starch exists as granules within the grain which are readily rendered acces-

sible to the saccharifying agent by grinding and cooking. A portion of the starch, however, is in the horn-like layer, the shell. This can only be rendered accessible by grinding to a high degree of fineness and cooking under pressure.

Hull-less cereals (wheat, rye, grain sorghums and dehulled rice) may be handled much the same way as corn, but hulled cereals (barley, oats and unhulled rice) give rise to a new problem since the hulls rise to the surface of the mash, thus holding fermentable material in suspension and preventing conversion into alcohol. Poor yields result unless preventative measures are taken. Probably it is easiest to mix these materials with low fiber materials such as corn, grain sorghums, molasses, or artichoke diffusion liquor. Hulled grains can be used without difficulty, if they do not constitute more than about 25 per cent. of the raw material in the mash.

The other class of crops that we have run at the Atchison plant are the tuber crops, including white potatoes, Jerusalem artichokes, and sweet potatoes. Probably the white potatoes require the closest regulation. The starch in white potatoes exists as relatively coarse granules within cells with a resistant wall. Our first problem is to rupture these cell walls. This can be readily accomplished by cooking under pressure long enough to break down the structure of the tuber and then treating with an enzymatic preparation of both cytase and diastase. Cytase is an enzyme that dissolves the cell walls containing the starch granules. The diastase then acts upon the starch granules and converts them into fermentable sugar. Green barley or rye malt, that is, sprouted barley or rye, not dried previous to using, contains the necessary enzymes. Extracts from certain molds may also be used. Associated with white potato starch are materials which form jellies. It is impossible to get a maximum of alcohol due to the stiffness caused by these substances. It is therefore desirable to process other materials along with the white potatoes, like artichoke diffusion liquor or diluted molasses. For best results white potatoes should not constitute over 50 per cent. of the raw material entering the mash.

The girasole (Jerusalem artichoke) is the easiest tuber crop to process. All that is necessary is to slice the tubers and transfer to a diffusion chamber where the carbohydrate is extracted with warm water. The extract contains within 2 per cent. as much sugar as the tuber. The water carrying the soluble carbohydrate is then sterilized and after cooling is ready to ferment. Hydrolysis is not necessary if the proper type of yeast is used. A plant may operate partly or entirely on artichokes. The residual pulp is conveyed to the rotary drier where it is recovered as feed with by-product heat.

The sweet potato is another valuable tuber relatively easy to process. Like white potatoes they require malting, but the starch is readily accessible and some of the carbohydrate already exists as sugar; therefore, less malt is required. The pectins present are not troublesome and maximum alcohol concentrations may be achieved with mashes consisting entirely of sweet potatoes.

The question arises as to the relative merits of tuber and various cereal crops. In general tuber crops yield at least twice as much alcohol per acre and at least 50 per cent. more by-product feed per acre than cereal crops. Cereals are non-perishable, their chief advantage. They are less bulky due to low moisture content compared with tubers which runs from 65 to 80 per cent. moisture. Growing tuber crops is considered more expensive than cereals; due more to lack of mechanization. Cereal crops are subject to various forms of destruction, such as hail, rains, and high winds against which tuber crops are relatively immune. The conclusion is that both cereal and tuber crops should be grown to divide the risk and distribute labor. In the past the tuber crop market has been small but as greater markets are offered they will no doubt receive more attention especially in the humid regions of the country. The expansion in tuber crop production will depend upon the price structure. The price that can be paid for any crop depends on alcohol yield and the quality and quantity of by-product feed.

The following table gives the average amount of alcohol and the by-product feed available from various materials.

Table 1

Raw product	Per bushel alcohol gal.	Feed residue lbs.	Per 100 lbs. alcohol gal.	Feed lbs.	Feed/alcohol
Barley	1.83	(23)	3.82	(49)	1.96
Corn	2.45	16	4.38	28	1.00
Oats	1.14	13	3.57	40	1.66
Rice (rough)	2.40	12	5.30	27	0.77
Rye	2.28	18	4.07	32	1.19
Sorghum grain	2.40	15	4.80	30	0.94
Wheat	2.54	19	4.24	32	1.15
Molasses	—	—	3.00	—	—
Girasole	—	—	1.25	7.4	0.90
Potatoes	0.64	2.6	1.06	4.3	0.61
Potatoes (sweet)	1.05	5.5	1.73	10	0.99

Alcohol is identical, but there is considerable variation in the quantity and analysis of the by-product feed, although little difference in appearance. Cereals yield by-product feed containing from 30-35 per cent. protein. The protein content of feed from tuber crops varies from 22-25 per cent. The feeds should not be compared on the basis of their total protein content but rather on the digestible protein content. We do not as yet have data on the percentage of digestible protein. Probably the by-product feed from alcohol plants is more highly digestible than feeds from other processes due to the fact that the material is first cooked, then subjected to proteolysis during fermentation and again cooked in the distillation process.

The price of raw materials high in non-fermentable solids is influenced to a considerable extent by the prevailing price of the by-product feed. The price of any material may be summed up in single mathematical statements as follows:

$$\frac{20S + F\ (P - 2)}{100} = \text{Price \$ per ton}$$

or

$$\frac{(20S + F\ (P - 2))\ W}{2000} = \text{Price in ¢ per bushel}$$

where S = per cent. fermentable solids
F = per cent. non-fermentable solids
P = Price per ton of by-product feed at plant
W = Weight per bushel

These formulas are applicable to operations where the by-product carbon dioxide is not recovered. Where this is done, the first constant may be increased with the net revenue obtained from the sale of this product. Likewise this constant may also be increased as the price of gasoline rises.

What amount of alcohol do the various crops produce per acre and what revenue may be expected? This, of course, varies with soil and climatic conditions. However, in case of an alcohol plant, the farmer may grow and sell the crops best suited to his soil and climatic conditions instead of being governed by the demands of the food market Higher yields may therefore be expected and rather than compare crops on their statistical average yields where food market demands influence the planting, I will confine the comparison to yields that may be expected from crops when planted on soils and under climatic conditions suited to it. The following table thus shows the comparison of a few crops.

Table 2

Crop	Yield per acre	Alcohol per acre gallons	By-Product Feed per acre lbs.	Gross Value per acre
Sweet potatoes	300 bu.	315	1650	$68.34
Jerusalem artichokes	15 tons	375	2320	86.36
Grain Sorghum	40 bu.	96	600	22.03
Corn	40 bu.	98	640	23.04
Wheat	30 bu.	76.2	570	18.94
Barley	40 bu.	73.2	920	23.38
Rye	40 bu.	91.2	920	25.98

Agrol—Practical Problems

By Dr. Leo M. Christensen

Chemical Foundation of Kansas Company

AMERICA'S first power alcohol plant at Atchison, Kansas was completed and in operation Oct. 1, 1936, and we have had six months of operation. We have experienced every major problem likely to be encountered in this industry and several legal, sociological and political problems are not yet fully answered.

Agrol motor fuels, containing 5 to 20 per cent. of properly prepared alcohol in suitable gasoline, have been very well received by motorists and no technical problems remain unsolved in the manufacture, distribution and use of these fuels. As the complex legal, sociological and political problems are solved, distribution has steadily increased. At present, after less than two months of operation under a usable denaturing formula, some 250 service stations are marketing alcohol blends in Kansas, Missouri, Nebraska, Iowa, North and South Dakota and Minnesota. We believe that there will be 1,000 service outlets within two or three months and these will take every drop of alcohol the Atchison plant can make and more than it was designed to produce.

Decision of the Foundation to sponsor the Atchison plant was based upon several factors. First and most important, the Bailor Manufacturing Co. owned and operated at Atchison a small alcohol plant which could be rather easily remodeled and expanded to produce power alcohol with satisfactory economy, and held a Federal permit to manufacture alcohol. Thus it was thought that the usual tedious negotiations to secure a Federal permit to operate could be avoided and to some degree this objective was realized, although there still remained an enormous amount of work in securing approval of the plans of operation. Second, Atchison is located in a district where a variety of crops may be grown, being in the west edge of the corn belt and in the east edge of the winter wheat section and having nearby a wide range of soil types. Third, Atchison is rather conveniently located to areas where there has been the greatest interest in power alcohol and the largest need for its development.

The result is therefore a remodeled grain alcohol plant. Practically all of the equipment previously used was employed in the new design, and the minimum of new equipment was purchased. In the design, provision was made for the maximum of flexibility so that a variety of raw materials might be used and improvements in processing developed. Unfortunately the requirement that permission of the Federal Alcohol Tax Unit be secured prior to most equipment changes has hampered research on improved processing methods and apparatus, but several valuable developments have been made.

The completed plant has a rated capacity of 10,000 gallons of anhydrous ethyl alcohol per 24 hours and can operate with grains or sugar syrups at this rate. Using grains, the requirement at capacity is 4,000 to 5,000 bushels per day. To operate with tubers at this capacity will require additional handling and processing equipment since 16 to 18 carloads per day are needed, but room has been left for it. A feed recovery unit capable of evaporating 100,000 gallons of water to produce 32 tons of dried feed per day was also installed and has shown excellent performance. The fuel compounding lot can handle 20,000 gallons of finished fuels per day in addition to the 10,000 gallons of alcohol produced.

The alcohol plant, including denaturing and feed recovery units, occupies 23,215 sq. ft. of ground. In addition, a fuel compounding plant had to be provided to meet Alcohol Tax Unit requirements and this department uses an additional 4,000 sq. ft. A part of the alcohol plant space is not economically used because the original plan to complete denaturation in the denaturing plant was not approved by the Tax Unit. Denaturing is actually done in three stages, first in the distillation operation, second in the denaturing plant and third in the fuel compounding department. In addition to the ground actually used for the plant, approximately 30,000 sq. ft. is needed for sidings, roadways and miscellaneous operations.

The first stage in the process used requires preparation of the raw material, involving cleaning, grinding or extracting, cooking and saccharifying. The second stage involves fermentation with carefully prepared pure strains of yeast. The third stage includes distillation of the alcohol of 95 per cent. concentration and its dehydration to 99.5 per cent. or better. The fourth stage consists of recovery and dehydration of all the residual feed constituents and other valuable by-products. The fifth stage includes all of the complex denaturing operations. Of the total plant investment, approximately 22 per cent. is represented by cooking, mashing and fermenting equipment, about 28 per cent. by distillation equipment, 16 per cent. by denaturing equipment, and about 16 per cent. for the by-products recovery units, the balance being required for grounds, buildings and steam and power equipment. The finished product, after denaturation in accordance with Federal Alcohol Tax Unit requirements, is sold under the name "Agrol Fluid."

Not all gasolines respond satisfactorily to the addition of alcohol. That is, the acceptability of the alcohol blend cannot always be predicted from the characteristics of the gasoline used, simply because there has not yet been sufficient experience to show the importance of all the factors involved. We have therefore followed the plan of requiring that the gasoline used in the preparation of blends first be submitted to us for careful laboratory and road tests. In this way it has been possible to secure a reasonable acceptable gasoline for all distribution, although in a few localities the gasoline available has not been wholly satisfactory. This situation is, of course, gradually being improved, and it can confidently be anticipated that the quality of Agrol motor fuels will steadily improve. In general, the gasolines used for making blends have been of 63-65 octane rating and generally have had volatility characteristics like those selected for gasolines to be distributed without alcohol addition in the same territory and under the climatic conditions which prevail. It is hoped that slight changes in volatility characteristics can soon be secured since the distribution is assuming sufficiently large volume to make practicable such changes at the refinery.

Agrol Fluid as now distributed contains 78 per cent. of ethyl alcohol, 6 per cent. of other ingredients derived from American farm products and 16 per cent. of materials produced from coal. The present Agrol Fluid formula contains only 8/10 of 1 per cent. of gasoline by volume but prior to April 1 all Agrol Fluid sold had to be diluted at Atchison with an equal volume of gasoline, and this requirement made it practically impossible to distribute on a competitive basis because of the added costs resulting from the broken haul. This Agrol Fluid is carried by transport to the refinery or bulk blending station where it is used in preparing Agrol 5, 10 or 15.

Agrol 5 contains from 5 to 7½ per cent. of Agrol Fluid by volume and has an anti-knock value equal to that of the best grades of "Regular" gasoline now marketed. Agrol 15 contains not less than 12½ nor more than 17½ per cent. of Agrol Fluid and has an anti-knock value higher than that of the commonly used premium fuels. Agrol 10—containing not less than 7½ nor more than 12½ per cent. of Agrol Fluid—is an intermediate grade suitable for use in the highest compression engines now used. Generally speaking, Agrol 5 sells at the price of "Regular" gasoline, while Agrol 10 and 15 command a premium of 1 to 2 cents per gallon. While most of the blends now marketed are of Agrol 5 grade, the interest is gradually shifting to Agrol 10 and it can be expected that this grade will shortly be the most popular. Few automotive vehicles require a fuel of the anti-knock value of Agrol 15. It

has been used in small volume in special engines and particularly for airplane engines where it has given excellent results. As compared with aviation gasolines, it has permitted higher engine speeds, lower fuel consumption and a complete freedom from frost accumulations in the intake manifold.

It was not particularly difficult to secure satisfactory equipment, and the plant design involved no serious problems, although several departures from established practice were incorporated. The problems encountered were of purely technical nature, except those of denaturation. To meet the Federal Alcohol Tax Unit requirements frequently caused serious delays and added expense since ordinarily the Tax Unit inspectors disapproved plans without indication of the design they desired. Generally it was necessary to learn by trial and error the arrangement which would be approved. Thus erection was delayed and the cost increased by the need to meet the regulations imposed upon all alcohol plants. The very devastating floods in Pennsylvania, resulting in closed equipment manufacturing plants, also caused some delay and added cost during the erection period. These two factors accounted for the delay in opening the plant, scheduled for July 1, 1936, to October 1, 1936.

It is only necessary to get the Agrol Fluid and a suitable grade of gasoline together, without broken or back hauls on either, to find a satisfactory sales arrangement. The solution of these problems is becoming steadily easier because of the experience gained and because of the growing desire of refiners to cooperate.

Denaturation has been by far the worst problem thus far encountered. Construction was greatly hampered by indecision in the Tax Unit concerning the denaturing formula and procedure. Finally it was decided that we must denature in three stages. The first step consists of adding two denaturants during the distillation of the alcohol, the product consisting of 95 per cent. of anhydrous ethyl alcohol and 5 per cent. of denaturants. The impure alcohol is then conducted to the denaturing plant proper, being weighed and analyzed at the time of this transfer. There a third material, technically the least important of all the denaturants finally used, is carefully weighed, analyzed and added to the alcohol in exact proportions. Up to this point, the operations are covered by a single permit and a $150,000 bond. The product is a recognized specially denatured alcohol and may be removed from the plant. This specially denatured alcohol is next transferred by means of a closed continuous pipe line, 12 feet above ground and open to inspection at all times, to a compounding lot, provided by a second permit and a $100,000 bond. At the compounding lot, five other denaturants are added, reducing the ethyl alcohol content to 46 per cent. and this product we are permitted to market without further restrictions.

In point of volume, the principal denaturant is gasoline. The broken and back hauls on this material add as much as 6 cents per gallon to the delivered alcohol cost. Early in December, 1936, we called at the Washington office of the Tax Unit, asking for relief from this situation. Only a week ago, we finally secured approval to move the alcohol mixed with all the denaturants except the gasoline to a single Nebraska point where the gasoline could be added. To do this we had to post an additional $100,000 bond, secure an additional permit and file a complete list of all the legal documents which had already been filed in the Kansas City and Washington offices, this time in the St. Paul office. Now we have applications on file for two other similar permits which we need to reach other distributing points.

On March 29, 1937, the Tax Unit approved a formula containing 78 per cent. of ethyl alcohol. Denaturing now increases the delivered cost of alcohol only $0.0258 per gallon, or practically $0.0342 less than it did prior to April 1, 1937. After receiving this relief, we spent nearly a month making necessary plant changes and late in April began distribution of this formula. We still have one unnecessary $100,000 bond and SDA permit which we have been trying two months to cancel, since it costs $500 per year. It seems as difficult to cancel an alcohol bond and permit as it was to obtain it.

The basic problem in all chemurgic industries is a dependable supply of suitable raw material at reasonably stable prices. Probably power alcohol is particularly dependent upon this arrangement since the product sells into a market of very low profit margins and well stabilized prices. The price at which power alcohol may be sold is practically solely determined by the cost of the raw material used in its manufacture so that the cost of the alcohol varies as widely as do raw material prices. The tremendous variability in farm product prices cannot possibly be absorbed in the manufacture of alcohol blends. The power alcohol industry can pay $20 per ton for feed grains on the average, need never pay less than about $15 and cannot pay more than $25 per ton. The average farm price for feed grains in the territory adjacent to Atchison has been $16 per ton. We are therefore prepared to pay practically one-third more than the average, need never pay as little as the bottom, and cannot pay the peak prices.

Several possible solutions have been suggested. The variability in farm product prices will automatically diminish as the chemurgic industries take larger and larger proportions of the total farm crop and present uncertain crops are replaced by others less affected by adverse weather conditions. Stabilization of farm product prices at levels mutually satisfactory to grower and user depends upon large industrial markets, and the development of the large industrial markets is dependent upon stable material prices. Discovery of the solution for this basic problem becomes the most urgent question before the Farm Chemurgic Council.

Miscellaneous

In the manufacture of textile fibers from casein, the casein is treated with dilute alkali and carbon bisulfide and the mixture "ripened". It is then spun in the same way as viscose, followed by washing, bleaching, hardening with formaldehyde, oiling and drying under tension. Product is soft, has silky luster, but is not very strong. It takes wool dyes with uniform results. *Textile Colorist*, p. 335.

Corrosive-proof Protective Linings

Protective rubber linings, bindable to smooth metal, are surfaces called "Permabond," manufactured by U. S. Rubber Products Co. Many kinds of chemicals may be handled more satisfactorily.

Heat-resisting Lacquers

Clear and pigmented air-drying lacquers (Durheat), for finishing electrical equipment, etc., normally subjected to elevated temperatures, are now marketed by Maas & Waldstein. Can be applied by spray or dip.

Explosives from Licorice

The woody residue left after extraction from licorice root is suggested by Italian chemists as substitute for cotton in explosives. Possibilities for use in rayon and other products are seen. *Chemistry & You*, Vol. 14, No. 3.

New Water Neutralizer

A neutralizer to make corrosive waters harmless has been placed on the market by Permutit Co.

U. S. Chemical Patents

A Complete Check—List of Products, Chemicals, Process Industries

Agricultural Chemicals

Mixing and screening apparatus for fertilizer materials, etc. No. 2,080,508. Augustus J. Sackett, Anne Arundel County, Md.

Production fertilizer; treating superphosphate with a solution of ammonium chloride in aqua ammonia. No. 2,081,401. Walter H. Kniskern, Prince George County, Va., and Chas. K. Lawrence, Syracuse, N. Y., to Solvay Process Co., New York City.

Production potassium sulfate fertilizer. No. 2,082,809. Robt. E. Pennell, Anderson, S. C.

Apparatus

Apparatus for recovering a vaporous constituent of a gas. No. 2,080,578. Arthur B. Ray, Bayside, N. Y., to Union Carbide & Carbon Corp., New York City.

Cellulose

Production cellulosic material; retting hemp, then subjecting hemp hurds to intermittent digestion with alkaline reagents. No. 2,080,533. Martin J. Connolly, New York City.

Production nitrocellulose; treating sheets of unbeaten wood pulp with gaseous hydrochloric acid admixed with water vapor, then nitrating. No. 2,080,934. Milton O. Schur to Brown Co., both of Berlin, N. H.

Bleached cellulosic product ,using chlorine in process. No. 2,081,267. John Campbell and Lancelot O. Rolleston, Glens Falls, N. Y., to International Paper Co., New York City.

Preparation crotonyl ether of cellulose obtained by the action of crotonyl chloride on cellulose in presence of a fixed caustic alkali. No. 2,082,797. Frederick C. Hahn to du Pont, both of Wilmington, Del.

Preparation metallic salts of dicarboxylic acid esters of cellulose. No. 2,082,804. Carl J. Malm and Chas. R. Fordyce, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Production purely white, strongly absorbing, highly viscous cellulose from alkali-liberated cellulose pulp. No. 2,083,280. Erik Bror Fredrik Sunesson, Skoghall, Sweden.

Coal Tar Chemicals

Production diphenyl from benzol. No. 20,367. Reissue. John N. Carothers, Anniston, Ala., to Monsanto Chemical Co., St. Louis, Mo.

Production diaryl hydrocarbons. No. 20,368. Reissue. John N. Carothers, Anniston, Ala., to Monsanto Chemical Co., St. Louis, Mo.

Cracked bituminous cement adapted for use as a road building, dust laying, wood preserving material, etc., containing cracked asphalt and cracked oil fractions. No. 2,080,688. Ulric B. Bray, Palos Verdes Estates, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Production filled asphalt, using finely divided mineral filler. No. 2,080,690. Ulric B. Bray, Palos Verdes Estates, and Lawton B. Beckwith, San Pedro, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Preparation nuclear alkylated condensation products of a mixture of commercial phenols derived from coal tar and a tertiary alcohol. No. 2,081,284. Frits E. Stockelbach, Montclair, N. J., to Harold H. Fries, doing business as Fries Bros., New York City.

Co-precipation of asphalt and wax. No. 2,081,310. Philip Subkow to Union Oil Co. of Calif., both of Los Angeles, Calif.

Method extracting tar acids from crude tar, using an alkali solution in process. No. 2,081,692. Chas M. Ambler, Jr., Phila., and Chas. E. Underwood, Bethlehem, Pa.; Ambler assignor to Sharples Specialty Co., Phila., Pa.; Underwood assignor to Bethlehem Steel Co., Bethlehem, Pa.

Production aminoalkyl sulfones. No. 2,081,718. Hanns Ufer, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., New York City.

Regenerative coke oven. No. 2,082,215. Carl Otto, Essen, Germany.

Manufacture acetyl cellulose of improved clarity. No. 2,082,238. Henri L. Barthelemy and Edw. E. Huffman, Rome, Ga., to Tubize Chatillon Corp., New York City.

Vertical retort for continuous distillation of carbonaceous materials. No. 2,082,270. Frederick Jos. West and Ernest West to West's Gas Improvement Co., Ltd., all of Miles Platting, Manchester, England.

Preparation substituted betaines. No. 2,082,275. Karl Daimler and Carl Platz, Frankfort-am-Main, Germany, to General Aniline Works, Inc., New York City.

Preparation 2-methyl-3-hydroxyquinoline-4-carboxylic acids. No. 2,082,358. Hans Schlichenmaier, Kelkheim-in-Taunus, and Ludwig Schornig, Frankfort-am-Main, Germany, to General Aniline Works, Inc., New York City.

Preparation isoviolanthrone derivatives. No. 2,082,560. Alex. John Wuertz and Wm. Hiram Lycan, So. Milwaukee, Wis., to du Pont, Wilmington, Del.

Recovery tar acids from crude tar. No. 2,082,626. Jules G. Hatman, Elkins Park, Pa., to Sharples Specialty Co., Phila., Pa.

Preparation diaryl amines. No. 2,082,815. Marshall F. Acken, Woodbury, N. J., to du Pont, Wilmington, Del.

Coke oven. No. 2,082,858. Friedrich Totzek, Essen-Stoppenberg, Germany, to Koppers Co., corp. of Del.

Preparation sulfoxylate-amino-arseno benzenes. No. 2,082,880. Alfred Fehrle, Bad Soden-in-Taunus, Karl Streitwolf, deceased, late of Frankfort-am-Main, by Frieda Streitwolf, administratrix, Frankfort-am-Main, and Paul Fritzsche, Frankfort-am-Main, Germany, to Winthrop Chemical Co., Inc., New York City.

Preparation beta-brom-ethyl benzene; combining hydrogen bromide with styrene in a solution in an organic solvent which does not react with hydrogen bromide. No. 2,082,946. Maurice Fluchaire, Tarare, and Serge Javorski, Lyon, France, to Societe des Usines Chimiques Rhone, Poulenc, Paris, France.

Process for improving inhibiting value of tars from distillation of solid carbonaceous materials. No. 2,083,197. Chas. D. Lowry, Jr., and Chas. G. Dryer to Universal Oil Products Co., all of Chicago, Ill.

Preparation 4,4-'dialkoxy diphenylamines. No. 2,083,214. Wm. Baird, Cecil Robt. Mavin, and Arthur Geo. Murray, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Production diazonium salts. No. 2,083,311. Gerald Bonhote and Adolf Wirz to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Coatings

Production bituminous emulsions of the slow breaking type. No. 2,080,689. Ulric B. Bray and Lawton B. Beckwith, Palos Verdes Estates, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Method and liquid coating composition for metal. No. 2,081,160. Robt. R. Tanner, Highland Park, Mich., to Metal Finishing Research Corp., Detroit, Mich.

Production precious metal decorations on ceramics, applying to lacquer containing bismuth, thereafter applying precious metal powder on the lacquered surface. No. 2,081,234. Alwin Hefter, Frankfort-am-Main, Germany, to Deutsche Gold und Silber Scheideanstalt vormals Roessler, Frankfort-am-Main, Germany.

Production rust-resisting coating on iron or steel, subjecting same to action of oxalic and nitric acids in solution. No. 2,081,449. Chas. B. Cook, Jr., West Hartford, Conn.

Separation asphalt from asphalt-containing oils. No. 2,081,473. Ulric B. Bray, Palos Verdes Estates, and Claude E. Swift, Glendale, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Production liquor finished ferrous wire; subjecting wire to action of a metallic salt solution to produce colored coating. No. 2,081,630. Wm. E. Leonard, Worcester, Mass., to American Steel & Wire Co. of New Jersey, corp. of N. J.

Separation wax from asphalt-wax mixtures. No. 2,081,733. Ulric B. Bray, Palos Verdes Estates, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Photomechanical reproduction of animal skins, etc., first applying a dark colored polishing wax. No. 2,081,916. Karl Eichstadt, Berlin-Friedenau, Germany, to Oxford Varnish Corp., Detroit, Mich.

Apparatus for coating filaments and staple fibers. No. 2,081,967. Wm. Whitehead, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Film base of non-fibrous, non-porous, flexible, organic material having a strongly adherent coating of a metal sulfide; coating being produced by treating material with a solution of a heavy salt, thereafter subjecting same to action of a sulfur-containing gas. No. 2,081,985. Ralph T. K. Cornwall, to Sylvania Industrial Corp., both of Fredericksburg, Va.

Spray gun for application of coatings to surfaces. Nos. 2,082,060-1. Alex. F. Jenkins, Baltimore, Md.

Production aliphatic amines. No. 2,082,105. Paul Herold and Karl Smeykal, Leuna, Germany, to I. G., Frankfort-am-Main, Germany.

Method coating abrasive grain with ceramic bond, using powdered plasticizer in process. No. 2,082,545. Evald C. Ljungberg to Norton Co., both of Worcester, Mass.

Protective homogeneous coating and process of applying and removing. No. 2,082,791. Lloyd G. Copeman, Flint, Mich.

Article with zinc surface covered by coating comprising insoluble salts of zinc and iron with phosphoric acid, coating being adapted to hold paint on said surface. No. 2,082,950. Matthew Green to Parker Rust-Proof Co., both of Detroit, Mich.

Preparation multi-ply semi-stiff collars; first coating a sheet of the intermediate ply material with a solution of a polymeric ester of methacrylic acid. No. 2,083,199. John Dorman McBurney, Newburgh, N. Y., and Edgar Hugo Nollau, Wilmington, Del., to du Pont, Wilmington, Del.

Apparatus for removing coatings. No. 2,083,407. De Hart G. Scranton, Maplewood, N. J., to Western Electric Co., Inc., New York City.

Dyes, Stains, etc.

Treatment dyeings prepared on cellulose materials by means of substantive dyestuffs. No. 2,080,543. Ferdinand Munz, Frankfort-am-Main, and Karl Keller, Frankfort-am-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Production nitro dyestuffs. No. 2,080,704. Erich Fischer, Bad Soden in Taunus, and Walter Gmelin, Frankfort-am-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Production indigoid vat dyestuffs containing in their molecule at least one alkoxy-alkoxy group. No. 2,080,862. Jaroslav Froelich to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Vat dyestuff preparations. No. 2,081,017. Josef Nusslein, Karl Daimler, and Carl Platz, Frankfort-am-Main, Germany, to General Aniline Works, Inc., New York City.

Monoazo dyes for coloring cellulose esters. No. 2,081,244. Georg Matzdorf and Erich Baumann, Dessau-in-Anhalt, Germany, to General Aniline Works, Inc., New York City.

Production anthraquinone dyestuffs capable of being chromed. No. 2,081,359. Georg Kranzlein, and Theo. Meissner, both of Frankfort-am-Main-Hochst, Hans Schlichenmaier, Kelkheim in Taunus, Germany, to General Aniline Works, Inc., New York City.

Production single and multicolored prints on paper and diapositives, coloring photographic gelatine printing matrices by means of colloidal solutions of dye bases, transferring absorbed dye base to a carrier provided with precipitants. No. 2,081,481. Richard Gschopf and Karl Pokorny, Vienna, Austria, Pokorny assignor to Gschopf.

Stable colored colloidal solution of a vat dyestuff, comprising a vat dyestuff in an aqueous alkaline solution of wool. No. 2,081,736. Cyril

Patents digested include issues of the "Patent Gazette," middle April 20 through June 8 inclusive.

Child and Harry Augustus Thomas, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., London, England.

Production anthraquinone dyestuffs. No. 2,081,755. Frank Lodge, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., London, England.

Production acid dyestuffs of the anthraquinone series. No. 2,081,756. Frank Lodge and Colin Henry Lumsden, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., London, England.

Production dyestuffs of the anthraquinone series. No. 2,081,874. Wm. H. Lycan, So. Milwaukee, Wis., to du Pont, Wilmington, Del.

Mineral dyeing liquor; the double decomposition of ferrous sulfate by means of crude acetate of lime in presence of a solvent stimulant, finally treating solution with an oxidizing medium. No. 2,082,087. Clarence B. White, Montclair, N. J.

Manufacture azo dyestuffs. No. 2,082,156. Friedrich Felix and Wilhelm Huber to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Production light sensitive derivatives of vat dyestuffs. No. 2,082,178. Paul Ochwat, Frankfort-am-Main-Hochst, and Bruno Wendt, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Production acid wool dyestuffs of the anthraquinone series. No. 2,082,192. Klaus Weinand, Leverkusen-I.-G. Werk, and Curt Bamberger, Cologne-Mulheim, Germany, to General Aniline Works, Inc., New York City.

Production high molecular dyestuffs of the dioxazine series. No. 2,082,344. Georg Kranzlein, Heinrich Greune, Werner Schultheis, Frankfort-am-Main, and Gerhard Langbein, Hofheim-am-Taunus, Germany, to General Aniline Works, Inc., New York City.

Production azo dyestuffs. No. 2,082,495. Karl Holzach and Bernd v. Bock, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., New York City.

Preparation quinone-azo dyestuffs soluble in water. No. 2,083,018. Fritz Hess and Karl Hager, Frankfort-am-Main-Hochst, and Werner Asch, Frankfort-am-Main-Sindlingen, Germany, to General Aniline Works, Inc., New York City.

Production polyazo dyestuffs soluble in water. No. 2,083,019. Fritz Hess and Walter Pense, Frankfort-am-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Compositions for dyeing animal fibers. Nos. 2,083,181-2. Henri Zweifel, Binningen, near Basel, and Chas. Graenacher, Fritz Grether, and Fritz Straub, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Device for preparing dyestuff solutions. No. 2,083,193. Jos. Sabetay Grassiana to Bruder Grassiani, both of Sofia, Bulgaria.

Production monoazo dyes. No. 2,083,216. Walther Benade and Max Raeck, Dessau in Anhalt, Erich Fischer, Bad Soden in Taunus, Germany, to General Aniline Works, Inc., New York City.

Manufacture monoazo dyestuffs. No. 2,083,308. Emil Senn, Reihen, near Basel, Switzerland, to firm of J. R. Geigy A. G., Basel, Switzerland.

Explosives

Production industrial explosive comprising potassium chlorate, sodium nitrate, shredded wood, and a liquid mixture of dinitrotoluene isomers. No. 2,083,143. Laud S. Byers, Glendale, Calif., to Halafax Explosives Co., Los Angeles, Calif.

Blasting explosive; free-running granular explosive containing wood particles, sodium nitrate, potassium chlorate, and liquid isomers of dinitrotoluene. No. 2,083,144. Laud S. Byers, Glendale, Calif., to Halafax Explosives Co., Los Angeles, Calif.

Fine Chemicals

Photographic material comprising a silver halide emulsion containing a 3.3-'dialkyl-benzoxo-indolenine-trimethinecyanine salt. No. 2,080,551. Hans Konrad Weichmann, Dessau-in-Anhalt, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation sulfoaromatic compound of certain higher aliphatic ketones. No. 2,081,795. Melvin de Groote, St. Louis, Mo., to Tretolite Co., Webster Groves, Mo.

Production pseudoazimido compounds. No. 2,082,160. Hans Henecka and Hans Andersag, Wuppertal-Elberfeld, Germany, to Winthrop Chemical Co., New York City.

Preparation basically substituted amino acridine derivatives. No. 2,082,171. Fritz Mietzsch and Hans Mauss, Wuppertal-Barmen, Germany, to Winthrop Chemical Co., Inc., New York City.

Production substituted aliphatic acids; hydroxyphenyl dihydro chaulmoogric acid. No. 2,082,459. Jos. B. Niederl, Brooklyn, N. Y.

Production phenyl ester, heating a phenol, a carboxylic acid, and an organic acid anhydride to a temperature above the B. P. of the acid corresponding to the anhydride. No. 2,082,790. Oscar A. Cherry, Chicago, Ill.

Production amino alcohols. No. 2,083,001. Max Bockmuhl, Gustav Ehrhart and Leonhard Stein, Frankfort-am-Main, Germany, to Winthrop Chemical Co., Inc., New York City.

Photographic material; carrier comprising a diazonium compound and method of obtaining contrasts. No. 2,083,285. Roelof Jan Hendrik Alink to N. V. Philips' Gloeilampenfabrieken, both of Eindhoven, Netherlands.

Glass, Ceramics

Ceramic frit for use with selenium and cadmium stains on ceramic bodies, capable of developing brilliant red, scarlet, and orange colors. No. 2,083,033. Andrew Malovinszky, So. Gate, and Albert L. Bennett, Glendale, Calif., to Malinite Corp., Los Angeles, Calif.

Industrial Chemicals, etc.

Production ethylene oxide by direct chemical combination of oxygen with ethylene in the proportions of one atom oxygen to one molecule ethylene. No. 20,370. Reissue. Theo. Emile Lefort, Paris, France, to Carbide & Carbon Chemicals Corp., New York City.

Sulfur stabilization and preservation; free flowing, finely divided dry sulfur containing a carbo-cyclic organic compound containing nitrogen in combined form, said compound being a liquid at 120°C. and a solvent for sulfur and soluble in molten sulfur. No. 2,080,408. John B. Ceccon, San Francisco, Calif., to San Francisco Sulphur Co., corporation of Calif.

Anti-corrosive hydraulic medium, comprising a composition containing an alcohol to lower the freezing point, water, and corrosion inhibiting quantities of urea. No. 2,080,422. Kenneth Harry Hoover, Deerfield, Ill., to Ass'n American Soap & Glycerine Producers, Inc., New York City.

Sulfur stabilization and preservation; free flowing, finely divided dry sulfur containing about 1% of a heterocyclic nitrogen containing compound having at least five members in the ring. No. 2,080,409. John B. Ceccon, San Francisco, Calif., to San Francisco Sulphur Co., corporation of Calif.

Manufacture anhydrous sodium sulfite. No. 2,080,528. Frederic C. Bowman, Los Angeles, and Holger Stougaard, Walnut Park, Calif., to A. R. Maas Chemical Co., Los Angeles, Calif.

Production ketene, by conducting acetone vapor through a tube filled with a catalyst consisting of carbon, withdrawing vapor mixture, cooling, condensing and separating acetone. No. 2,080,562. Wolfram Eschenbach, Munich, Germany.

Removal arsenical impurities from solution containing the same; using acetic acid, tannic acid and ferric hydroxide in process. No. 2,080,582. Victor E. Speas and Nathan M. Mnookin to Speas Mfg. Co., all of Kansas City, Mo.

Process obtaining finely divided calcium carbonate; by dispersing same in an alkaline solution. No. 2,080,616. Geo. Lynn, Wadsworth, and Edw. M. Allen, Barberton, O., to Pittsburgh Plate Glass Co., corporation of Penna.

Process of and apparatus for purifying hydrogen. No. 2,080,621. Raymond P. Mattern, Elkhart, Ind., to Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Manufacture unsaturated hydrocarbon gases. No. 2,080,767. Henry Dreyfus, London, England.

Purification of combustion gases containing oxides of sulfur, bringing gases into contact with an aqueous washing medium containing in suspension calcium carbonate and solid calcium sulfate dihydrate. No. 2,080,779. Rudolf Lessing to Imperial Chemical Industries, Ltd., both of London, England.

Method of and apparatus for adding reagents to liquids. No. 2,080,872. William Paterson, London, England.

Production lime from oyster shells. No. 2,080,883. Albert B. Wood, New Orleans, La.

Process and apparatus for production of lime and carbon dioxide. No. 2,080,981. George H. Haas, Lakeville, Conn.

Continuous method generating hydrochloric acid; continuously feeding salt and sulfuric acid to a rotating heated reaction zone. No. 2,081,118. Harry A. Kast, Cranford, N. J., to American Cyanamid Co., New York City.

Catalytic oxidation of organic compounds. No. 2,081,120. Blythe M. Reynolds, Utica, N. Y.

Method and apparatus for direct compression of gaseous or vaporous medium. No. 2,081,149. Ulrich Meininghaus, Mulheim-Ruhr, Germany, to Holzwarth Gas Turbine Co., San Francisco, Calif.

Manufacture sucrose octanitrate having a six-sided plate structure. No. 2,081,161. Jos. A. Wyler, Allentown, Pa., to Trojan Powder Co., corp. of New York.

Production alcohols by use of ethyl sulfuric acid. No. 2,081,166. Benjamin T. Brooks, Old Greenwich, Conn.

Prevention scale depositions and removal from metallic surfaces, subjecting surface to action of an aqueous solution of an ammonium salt of a water soluble sulfonic acid resulting from treatment of petroleum with concentrated sulfuric acid. No. 2,081,168. Boris S. de Mering, Houston, Tex., to Standard Oil Development Co., corp. of Del.

Manufacture hydrogen peroxide from an aqueous solution of a percompound which hydrolytically decomposes to produce hydrogen peroxide. No. 2,081,097. Willem Reinders, Delft, Netherlands, to Naamlooze Vennootschap Industrieele Maatschappij Voorheen Noury & Van Der Lande, Deventer, Netherlands.

Production chlorinated hydrocarbon in non-caking powdered form. No. 2,081,236. Wilbie S. Hinegardner, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Preparation vanadium oxide catalyst. No. 2,081,272. Harold B. Foster, Williamsville, N. Y., to National Aniline & Chemical Co., New York City.

Process and apparatus for conducting chemical reactions. No. 2,081,322. Samuel C. Carney, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Chlorine-free bleaching process. No. 2,081,327. Ehrhart Franz, Leipzig, Germany.

Removal lead compounds from strong phosphoric acid. No. 2,081,351. Chas F. Booth and John E. Malowan, Anniston, Ala., to Monsanto Chemical Co., St. Louis, Mo.

Preparation glyoxylic acid; reacting upon a metal salt of dichloracetic acid in dilute aqueous solution with a metal salt of another organic acid. No. 2,081,355. Paul Heisel, Gersthofen, near Augsburg, Germany, to I. G., Frankfort-am-Main, Germany.

Method concentrating and separating components of gaseous mixtures. No. 2,081,406. Edoardo Mazza, Turin, Italy.

Production aliphatic carbonyl compounds; heating a solution in an inert organic solvent of a calcium salt of a fatty acid and calcium formate. No. 2,081,506. Hermann Prückner to Bohme Fettchemie-Gesellschaft Haftung, both of Chemnitz, Germany.

Insulator having glass surface, an area of which is stained with a metal of the group of copper and silver. No. 2,081,508. Wm. W. Shaver to Corning Glass Works, both of Corning, N. Y.

Process solidifying and tightening sandy masses, loose soils, building structures, introducing into mass to be treated a labile solution of a material containing silicic acid, ammonia and a gas. No. 2,081,541. Hugo Joosten, Berlin-Schoeneberg, Germany.

Manufacture carbon bisulfide; reacting sulfur and coke. No. 2,081,576. Bernard M. Carter, Montclair, N. J., to General Chemical Co., New York City.

Method preventing efflorescence on surface of colored roofing granules; using barium carbonate, color pigment, and a binder containing frit. No. 2,081,609. Paul Teetor, Castleton, Vt., to Central Commercial Co., corp. of Ill.

Indurating composition for concrete or mortar; comprising waste sulfite liquor and calcium chloride. No. 2,081,642. Edw. W. Scripture, Jr., Shaker Heights, O.

Indurating composition for concrete or mortar; comprising waste sulfite liquor and alkali metal silicate. No. 2,081,643. Edw. W. Scripture, Jr., Shaker Heights, O.

Production thiorethers, acting on a mercaptan with acetylene in presence of a metal compound. No. 2,081,766. Walter Reppe and Fritz Nicolai, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production acetaldehyde from acetylene. No. 2,081,770. Walter Rosinsky, Oppau, Germany, to I. G. Frankfort-am-Main, Germany.

Electrolytic process and apparatus for production of chromic acid and caustic alkali. No. 2,081,787. John W. Boss to Chromium Products Corp., Livingston, Mont.

Manufacture sulfonation products from higher molecular organic compounds. No. 2,081,865. Eberhard Elbel to Henkel & Cie, Gesellschaft m. b. H., both of Dusseldorf, Germany.

Preparation diaryl oxide sulfonic acids. No. 2,081,876. Milton A. Prahl, Milwaukee, Wis., to du Pont, Wilmington, Del.

Destructive distillation of carbonaceous material. No. 20,392. Reissue. Lewis C. Karrick, Salt Lake City, Utah.

Electric element; comprising a fused alkali metal cathode and a dry anode substance capable of releasing oxygen. No. 2,081,926. Janos Gyuris, Budapest, Hungary.

Manufacture refractory cement; first bonding together particles of exfoliated vermiculite with a magnesium oxy-sulfate cement. No. 2,081,935. Otis L. Jones, one-half to Illinois Clay Products Co., and one-half to F. E. Schundler & Co., Inc., all of Joliet, Ill.

Dehydrating fuel gas and concurrently purifying it of hydrogen sulfide. No. 2,081,960. Frederick W. Sperr, Jr., Ventnor, N. J., to Koppers Co., corp. of Del.

Removal and recovery sulfur dioxide from waste gases. No. 2,082,006. Henry F. Johnstone to Board of Trustees of University of Ill., both of Urbana, Ill.

Apparatus for countercurrent contact treatment of liquids. No. 2,082,034. Reading B. Smith, Hammond, Ind., to Sinclair Refining Co., New York City.

Treatment mixture of calcium and magnesium hydroxides. No. 2,082,101. Elmer E. Dougherty, Glen Ridge, N. J., one-half to N. I. Stone, New York City.

Production resistance element, using silver sulfide powder in process. No. 2,082,102. Jos. R. Fisher, Brooklyn, N. Y., to Bell Telephone Labs., Inc., New York City.

Production calcium hydride by a simultaneous action of hydrogen and magnesium on calcium oxide. No. 2,082,134. Peter Popow Alexander, Marblehead, Mass.

Reagent feeder. No. 2,082,149. John H. Cheavens, Samne, Peru, to American Smelting & Refining Co., New York City.

Manufacture reenforced abrasive member. No. 2,082,150. Alden H. Coffman to H. H. Robertson Co., both of Pittsburgh, Pa.

Dehydration of antimony trifluoride and manufacture of fluorinated aliphatic compounds. No. 2,082,161. Albert L. Henne, Columbus, O., to General Motors Corp., corp. of Del.

Manufacture abrasive articles. No. 2,082,182. Elmer C. Schacht, Troy, N. Y., to Behr-Manning Corp., corp. of Mass.

Manufacture cold lay pavement. No. 2,082,259. Leo T. Peden, Houston, Texas.

Heating apparatus for breaking down emulsions. No. 2,082,337. Jos. W. Hays, Tulsa, Okla.

Treatment mineral sand for recovery of zircon; agitating sand with air in a dilute soap solution containing oil, separating zircon by a flotation process. No. 2,082,383. Miles Andrew Corbett, London, England.

Production esters of nucleotides. No. 2,082,395. Max Hartmann, Riehen, near Basel, and Fritz Locher, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation synthetic tans; comprising condensation products of aromatic hydroxy compounds. No. 2,082,477. Richard Alles, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Treating an aqueous liquid containing an alkaline compound of a metal for use in industry. No. 2,082,491. Walter H. Green, Chicago, Ill., to Infilco, Inc., corp. of Del.

Production alumina, free from silicic acid, from alkaline earth aluminates. No. 2,082,526. Josef Stohr and Erich Reidt, Waldshut, Germany, to Lonza Elektrizitatswerke und Chemische Fabriken Aktiengesellschaft (Gampel), Basel, Switzerland.

Purification sugar solutions, using hydrogen peroxide in process. No. 2,082,656. Jos. S. Reichert and Ralph B. Elliott, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Method of and apparatus for filtering high viscosity liquids. No. 2,082,847. Earl Petty to Alco Products, Inc., both of New York City.

Mixing and coagulating device. No. 2,082,855. Marcus B. Tark, Phila., Pa., to Link-Belt Co., Chicago, Ill.

Process for extraction of magnesium and bromine from sea water. No. 2,082,989. Alfred M. Thomsen, San Francisco, Calif.

Process synthesizing urea from ammonia and CO_2 under urea-forming conditions of pressure and temperature, maintaining the presence of formamide in the urea synthesis melt. No. 2,083,010. Harold W. de Ropp, Charleston, W. Va., to du Pont, Wilmington, Del.

Method precipitating copper from its solution in the liquid of an ore pulp. No. 2,083,031. Francis W. Maclennan to Miami Copper Co., both of Miami, Arizona.

Method of and apparatus for automatically distributing air blast to ore smelting furnaces. No. 2,083,046. John H. Q. Burke, Oklahoma City, Okla.

Method dissolving calcium chloride. No. 2,083,076. Geo. A. Mau, Lakewood, O., to Coal Treating & Equipment Co., Cleveland, O.

Purification synthetic methanol. No. 2,083,125. Rudolf Scheuble, Vienna, Austria, to I. G., Frankfort-am-Main, Germany.

Production glass wool fibers coated with a film deposited from an emulsion of oil and water which adequately lubricates fibers but is insufficient to propagate flame at the normal ignition temperature of the oil. No. 2,083,132. Robt. C. Williams and Hugh M. Bone, Columbus, O., to Owens-Illinois Glass Co., Toledo, O.

Increasing lubricating power of lubricating oils; adding to a first body of oil an oil which has been subjected to chemical action in presence of naphthalene, nitro-benzol, rubber, and dimethylaniline. No. 2,083,139. Warren G. Black, Cleveland, O

Lubricant for rubber bearing members comprising finely divided graphite, glycerol, and water. No. 2,083,176. Geo. F. Willson, Cleveland Heights, O., to Acheson Colloid Corp., New York City.

Manufacture cement. No. 2,083,179. Lincoln T. Work, New York City.

Method bleaching and/or dyeing foliage; subjecting same to action of primary aliphatic alcohol having less than 3 carbon atoms. No. 2,083,191. Henry Dux, Jacksonville, Fla.

Recovery hydrogen sulfide from gases. No. 2,083,213. Hans Baehr and Karl Braus, Leuna, Germany, to I. G., Frankfort-am-Main, Germany.

Chemical apparatus. No. 2,083,228. Wm. O. Geyer, Bloomfield, N. J.

Production cement. No. 2,083,267. Guy W. Jordan, Rockmart, Ga.

Reactivation of mineral absorbents. No. 2,083,269. Geo. R. Lewers to Decarie Incinerator Corp., both of New York City.

Production activated carbon. No. 2,083,303. Franz Krezil, Aussig-on-Elbe, Czechoslovakia.

Acidproof tank having inner shell composed of brick and sulfur cement and a lining of asphalt between inner and outer shells. No. 2,083,469. Richard Neuhaus to Nukem Products Corp., both of Buffalo, N. Y.

Gas analyzing process and apparatus. No. 2,083,520. Benjamin Miller, Richmond Hill, N. Y., to Power Patents Co., Jersey City, N. J.

Method determining which one of two mutually reactive components is present in excess in a gaseous mixture. No. 2,083,521. Benjamin Miller, Richmond Hill, N. Y., to Power Patents Co., Jersey City, N. J.

Gas analyzing apparatus. No. 2,083,522. John D. Morgan, So. Orange, N. J., to Power Patents Co., Jersey City, N. J.

Metals, Alloys, Ores

Apparatus for gas-cutting and welding of metals. No. 2,080,396. Lorn Campbell, Jr., Lakewood, Ohio.

Cyanide-zinc electroplating composition adapted for plating of a deposit. No. 2,080,479. Elliott F. Hoff, Willoughby, O., to du Pont, Wilmington, Del.

Cyanide-zinc electroplating composition containing a thiourea. No. 2,080,483. Richard O. Hull, Lakewood, O., to du Pont, Wilmington, Del.

Process of and apparatus for electroplating. No. 2,080,506. Franklin B. Rinck, LaGrange, and Ray C. Kivley, Oak Park, Ill., to Western Electric Co., Inc., New York City.

Cyanide-zinc electroplating composition for plating a deposit. No. 2,080,520. Leon R. Westbrook, Cleveland Heights, O., to du Pont, Wilmington, Del.

Pickling bath for iron and steel, comprising an acid solution containing a parazine derivative having in the para position to the nitrogen an atom selected from the group of nitrogen and sulfur. No. 2,080,553. Alex L. Wilson and Albert B. Boese, Jr., Pittsburgh, Pa., to Union Carbide & Carbon Corp., New York City.

Manufacture wire, rods, etc., by coating stock with lime, then drawing stock through a die, with a lubricant comprising aluminum palmitate. No. 2,080,599. Silas A. Braley to Pittsburgh Steel Co., both of Pittsburgh, Pa.

Apparatus for purifying and refining molten metals. No. 2,080,625. Florian E. Miller, Columbus, O.

Electric contact consisting of an alloy of cadmium, nickel, and silver. No. 2,080,811. Kenneth L. Emmert, Indianapolis, Ind., to P. R. Mallory & Co., Inc., both of Indianapolis, Ind.

Production sintered alloy containing tungsten carbide, and a carbide from the group columbium carbide and tantalum carbide. No. 2,081,049. Hugh S. Cooper, Cleveland, O., to General Electric Co., Schenectady, N. Y.

Conditioning a wax-bearing oil preparatory to separation of wax; mixing oil with an asphaltic fraction recovered from a used crankcase oil. No. 2,081,297. Ross J. Garofalo, Los Angeles, Calif., and Claude E. Swift, Glendale, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Apparatus for ore concentration and separation. No. 2,081,182. Sven Malke, Milwaukee, and Eric A. Kjellgren, West Allis, Wis., to A. O. Smith Corp., Milwaukee, Wis.

Apparatus for treating ore. No. 2,081,240. Edwin L. Knapp and Samuel J. Leask, Anacortes, Wash.

Process and apparatus for separating oil from wax cakes. No. 2,081,300. Basil Hopper, San Pedro, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Apparatus for flocculation. Nos. 2,081,851-2. Geo. M. Darby and Elliott J. Roberts, Westport, Conn., and Wm. C. Weber, Larchmont, N. Y., to Dorr Co., Inc., New York City.

Preparation electron emissive cathode; coating a nickel core with a mixture comprising alkaline earth carbonate and an oxide of nickel. No. 2,081,864. Donald V. Edwards, Montclair, and Earl K. Smith, East Orange, N. J., to Electrons, Inc. of Del., corp. of Del.

Process and apparatus for fusion welding. No. 2,081,897. James L. Anderson, Closter, N. J., to Air Reduction Co., Inc., New York City.

Production aluminum-magnesium alloy containing magnesium, calcium, and a lead or tin element. No. 2,081,951. Roy E. Paine, Cleveland, and John S. Harrison, Cleveland Heights, O., to Aluminum Co. of America, Pittsburgh, Pa.

Solubilizing beryllium content of beryllium-containing ores; contacting ore with gaseous silicon fluoride in presence of heat and absence of any other reactant, and leaching with water. No. 2,081,984. Harry C. Claflin, Marysville, Mich., to Beryllium Corp., New York City.

Manufacture porous metallic bodies. No. 2,082,126. Rudolf Schulz, Stuttgart, Germany.

Method and apparatus for concentrating ores. No. 2,082,157. Franklin T. Grant, San Diego, Calif.

Method galvanizing articles; using bath of molten zinc into which has been incorporated an alloy of phosphorus and a carrier metal. No. 2,082,225. Wm. H. Spowers, Jr., Maplewood, N. J., Sam Tour, New York City, Thos. A. Wright, Plainfield, and Lewis S. Reid, Upper Montclair, N. J., to Wm. H. Spowers, Jr., New York City.

Process obtaining non-ferrous metal from iron-containing ores of sulfidic or arsenical nature. No. 2,082,284. Carl Goetz, Berlin, Germany.

Manufacture alloys; first adding briquettes containing an alloying ingredient to a slag-covered bath of molten metal. No. 2,082,359. Erich Schumacher, Unna-Konigsborn, Germany, to Maschinenfabrik Esslingen, Esslingen, Wurttemberg, Germany.

Production finely divided metallic products; first forming amalgam containing copper and mercury. No. 2,082,362. James L. Stevens, Hayden, Ariz.

Decolorizing sugar juices, using hydrogen peroxide and a substance of increased surface action in process. No. 2,082,425. Emil Scheller, Lorsbach in Taunus, Germany, to Deutsche Gold und Silber Scheideanstalt vormals Roessler, Frankfort-am-Main, Germany.

Recovery tin from material containing tin, lead, and antimony. No. 2,082,487. Frederick F. Frick, Anaconda, Mont., to International Smelting & Refining Co., East Chicago, Ind.

Process coating metals with aluminum. No. 2,082,622. Colin G. Fink, New York City.

Production hard metal alloy. No. 2,082,719. Alan Richard Powell and Ernest Robt. Box, London, England, to Johnson Matthey & Co., Ltd.

Manufacture ferrous alloys containing chromium, nickel, and iron. No. 2,082,783. Thos. N. Armstrong, Jr., and Fred. B. Anderson, Portsmouth, Va.

Production concentrate of chrome ores. No. 2,082,817. Gustav Arnold, Wadenswil, Switzerland, to Eduard von Orelli, Zurich, Switzerland.

Apparatus for degreasing metals and other non-absorbent articles by means of volatile grease solvents. No. 2,083,012. Robt. Anderson Eastwood, Weston, near Runcorn, England, to Imperial Chemical Industries, Ltd., London, England.

Process pickling metallic surfaces, by treatment in a bath of organic sulfonic acid. No. 2,083,014. Michael W. Freeman, Detroit, Mich.

Apparatus for welding. No. 2,083,034. Earnest W. Mishler to Youngstown Sheet & Tube Co., both of Youngstown, O.

Method and apparatus for welding. No. 2,083,309. Robt. R. Applegate, Shaker Heights, O.

Method treating metals; subjecting the heating metal to a broken down and reformed gas consisting of hydrogen, carbon monoxide, and methane. No. 2,083,433. Geo. M. Croft, Dormont, and John A. Hunter, Ben Avon, Pa., to American Sheet & Tin Plate Co., corp. of N. J.

Corrosion resistant alloy, containing chromium, nickel, carbon, molybdenum, and silicon. No. 2,083,524. Peter Payson, New York City.

Paper and Pulp

Manufacture white paper; using fibrous material and white water-insoluble oxalate filler. No. 2,077,393. Arthur Minard Brooks, Andover, Mass., to Raffold Process Corp., corporation of Mass.

Manufacture paper filled with alkaline filler; said filler being present in excess in respect to the chemical equivalent of any acidic ingredient. No. 2,077,436. Harold Robt. Rafton, Andover, Mass., to Raffold Process Corp., corporation of Mass.

Paper web forming apparatus. No. 2,077,614. Wm. Boyd Campbell, Montreal, Canada, to Harry John Rowley, Quebec City, Que., Canada.
Powder-applying mechanism for a paper-making machine. No. 2,077,726. Diong D. Uong to Fitchburg Paper Co., both of Fitchburg, Mass.
Production multiply latex-treated paper. No. 2,077,998. Ferdinand W. Humphner, Oak Park, Ill., to Mid-States Gummed Paper Co., Chicago, Ill.
Method and apparatus for beating paper pulp. No. 2,078,030. Walter N. Sherwood, North Hoosick, N. Y.
Intercepting member for paper stock treating machines. No. 2,078,218. Archer LeRoy Bolton, North Andover, Mass., to John W. Bolton & Sons, Inc., Lawrence, Mass.
Apparatus for treatment of pulp making material. No. 2,078,222. Chas. D. Altick, Lloyd D. Smiley, and Edward T. Turner to Pulp Process & Development, Inc., all of Dayton, O.
Treatment paper to render it water repellent; using caustic soda, water, a vegetable oil, and carbon bisulfide in process. No. 2,079,993. Thos. Hans, Chicago, Ill.
Manufacture paper. No. 2,080,362. Luther B. Rogers, Methuen, Mass., to Champion-International Co., Lawrence, Mass.
Manufacture white paper using alkaline filler. No. 2,080,437. Harold Robert Rafton, Andover, Mass., to Raffold Process Corp., corporation of Mass.
Converter apparatus for conditioning and waxing paper. No. 2,081,324. Lloyd L. Dodge to Rhinelander Paper Co., both of Rhinelander, Wis.
Apparatus for removing water, etc., from a web of waxed paper. No. 2,081,456. Chas. W. Howard, Franklin, Ohio, to Black-Clawson Co., Hamilton, O.
Means and method of drying flexible coated webs. No. 2,081,945. Peter J. Massey, River Forest, Ill., and Wm. F. Thiele and Bert F. Raprager, Wisconsin Rapids, Wis., nine-tenths to Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.; and one-tenth to said Massey.
Adhesive and moisture-proofing composition for paper products, consisting of a hydrogenated oil, and a rubber product. No. 2,082,278. Robt. R. Ferguson, Chevy Chase, Md., one-fourth to John G. Graham, Alexandria, Va., and one-fourth to Paul V. Rogers, Chevy Chase, Md.
Paper waxing mechanism. No. 2,083,273. Chas. H. O'Neil to Nashua Gummed & Coated Paper Co., both of Nashua, N. H.
Process bleaching pulp for paper manufacture, mixing fibrous pulp with hydrated lime, then injecting free liquid chlorine into mixture. No. 2,083,294. Francis J. Cirves, Manistee, Mich.
Process of applying to paper a slack-sized mineral coating, drying, calendering, and applying a top coating of lacquer. No. 2,083,441. Frederick H. Frost, Westbrook, Me., to S. D. Warren Co., Boston, Mass.

Petroleum and Petroleum Chemicals

Method dewaxing viscous petroleum oil. No. 2,077,656. Robt. E. Wilson to Standard Oil Co., both of Chicago, Ill.
Oil well pumping assembly. No. 2,077,665. Edwin O. Bennett to Continental Oil Co., both of Ponca City, Okla.
Preparation mixed tertiary hexyl ethers. No. 2,077,681. Theodore Evans, Kensington Park, and Karl R. Edlund, Berkeley, Cal., to Shell Development Co., San Francisco, Calif.
Method separating wax from a wax-bearing lubricating oil stock. No. 2,077,712. Jos. K. Roberts and Morris T. Carpenter, Hammond, Ind., to Standard Oil Co., Chicago, Ill.
Process for breaking petroleum emulsions of the water-in-oil type. No. 2,077,745. Melvin de Groote, St. Louis, Mo., to Tretolite Co., Webster Groves, Mo.
Process for breaking petroleum emulsions of the water-in-oil type. No. 2,077,746. Melvin De Groote, St. Louis and Arthur F. Wirtel, Kirkwood, Mo., to Tretolite Co., Webster Groves, Mo.
Production lubricating compound, adapted for saturating railway car journal waste and for the lubrication of such journals. No. 2,077,762. Carl E. Lauer, Port Arthur, Tex., to Texas Co., New York City.
Production synthetic lubricating oil. No. 2,077,781. LeRoy G. Story, Glenham, N. Y., to Texas Co., New York City.
Refining materials of the sperm oil type. No. 2,077,837. Wilhelm Holwech, Oslo, Norway.
Method forming bituminous emulsions. No. 2,077,905. Preston R. Smith, Rahway, N. J., to Barber Co., Inc., Phila., Pa.
Production dehydrogenated motor fuel containing aromatic compounds. No. 2,077,994. Carleton Ellis to Ellis-Foster Co., both of Montclair, N. J.
Paraffin remover for oil wells. No. 2,078,107. Karl C. Ten Brink, Wichita Falls, Tex.
Process of oil separation by adding a mixed base oil including paraffinic and naphthenic components to a body of ethylene dichloride. No. 2,078,186. Everett R. Wiles, Barnsdall, Okla., to Barnsdall Refining Corp., corporation of Del.
Manufacture high anti-knock stable low boiling hydrocarbons from high boiling hydrocarbons. No. 2,078,247. Eugene J. Houdry, Paris, France, to Houdry Process Corp., Dover, Del.
Oil well pump. No. 2,078,322. Geo. A. Gage, Tulsa, Okla.
Method of treating hydrocarbon oil. No. 2,078,407. Bernard Ormont to Bernard Ormont Associates, Inc., both of New York City.
Solvent refining of mineral oil. No. 2,078,442. Louis A. Clarke, Fishkill, N. Y., to Texas Co., New York City.
Lubricating oil of improved character. No. 2,078,472. Chas. C. Towne, Poughkeepsie, N. Y., to Texas Co., New York City.
Process altering boiling point of hydrocarbons. No. 2,078,493. John Stewart Harrison, Cleveland Heights, O., to Standard Oil Co., Cleveland, O.
Production cyclic acetals; treating unsaturated alcohol, possessing an olefinic linkage, between 2 aliphatic carbon atoms, with a mineral acid-acting compound. No. 2,078,534. Herbert P. Groll and Geo. Hearne, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.
Production amines by emulsion method; first forming an emulsion of a halide of a lower aliphatic hydrocarbon in liquid state and ammonia, then heating. No. 2,078,555. Cesare Barbieri, New York City.
Cyclic process of producing amines of unsaturated hydrocarbons. No. 2,078,582. Morris S. Nafash, Union City, N. J., to Cesare Barbieri, New York City.
Process for breaking petroleum emulsions of the water-in-oil type. Nos. 2,078,652-3. Melvin De Groote, St. Louis, and Bernhard Keiser, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.
Process for breaking petroleum emulsions of the water-in-oil type. Nos. 2,078,654-5. Melvin DeGroote, St. Louis, Mo., to Tretolite Co., Webster Groves, Mo.
Acoustical treatment of wells. No. 2,078,731. Ralph Forbush Norris, Madison, Wis., to C. F. Burgess Labs., Inc., Chicago, Ill.

Anti-knock motor fuel comprising an aqueous tertiary butyl alcohol containing water. No. 2,078,736. Hendrik B. J. Schurink, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.
Method reclaiming spent doctor solution, containing lead sulfide in suspension. No. 2,078,773. Evert T. Pummill, Augusta, Kans., to Socony-Vacuum Oil Co., New York City.
Preparation fuel oil; treatment an acid-oil sludge. No. 2,078,882. Rufus L. Savage, Jr., Port Arthur, Tex., to Texas Co., New York City.
Oil cracking process. No. 2,078,899. Harold Sydnor, Westfield, N. J., to Standard Oil Development Co., corporation of Del.
Rigid homogeneous catalytic mass or unit for the conversion and treatment of hydrocarbons, formed of an active or activated hydrosilicate of alumina. No. 2,078,945. Eugene J. Houdry, Ardmore, Pa., to Houdry Process Corp., Dover, Del.
Process transforming high boiling hydrocarbons into lower boiling hydrocarbons. No. 2,078,946. Eugene J. Houdry, Woodbury, N. J., to Houdry Process Corp., Dover, Del.
Treatment or transformation of hydrocarbons and their derivatives by the use of adsorptive silicious contact masses. No. 2,078,951. Eugene J. Houdry, Rosemont, Pa., to Houdry Process Corp., Dover, Del.
Propane dewaxing system. No. 2,078,992. Daniel B. Banks, Upper Darby, Pa., and Paul D. Barton, Scarsdale, N. Y., to Sun Oil Co., Phila., Pa.
Apparatus for dispensing liquid hydrocarbons. No. 2,079,027. Daniel Myon to Societe d'Etude de Distributeurs Automatiques S. E. D. A., both of Paris, France.
Refinement hydrocarbon lubricant oil stock to remove naphthenic substances. No. 2,079,035. Theodor A. Petry, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.
Stabilization hydrocarbon oils against sludge and color formation. No. 2,079,051. Frederick W. Sullivan, Jr. and Bernard H. Shoemaker, Hammond, Ind., and Kenneth Taylor, Chicago, Ill., to Standard Oil Co., Chicago, Ill.
Conversion hydrocarbon oils. No. 2,079,148. John B. Barnes to Universal Oil Products Co., both of Chicago, Ill.
Treatment hydrocarbon oils. No. 2,079,158. Nicholas G. de Rachat to Universal Oil Products Co., both of Chicago, Ill.
Continuous process for converting hydrocarbon oils. No. 2,079,159. Carbon P. Dubbs, Wilmette, Ill., to Universal Oil Products Co., Chicago, Ill.
Conversion hydrocarbon oils. No. 2,079,168. Jacob Benjamin Heid to Universal Oil Products Co., both of Chicago, Ill.
Treatment of hydrocarbon oils. No. 2,079,187. Jean Delattre Seguy to Universal Oil Products Co., both of Chicago, Ill.
Manufacture synthetic aliphatic organic monocarboxylic acids by catalytic addition of carbon monoxide and water to olefinic hydrocarbons. No. 2,079,216. Alfred T. Larson to du Pont, both of Wilmington, Del.
Apparatus and method for heating hydrocarbon fluids to a cracking temperature. No. 2,079,219. Walter E. Lobo, Westfield, N. J., to Gasoline Products Co., Inc., Newark, N. J.
Oil for treating fibrous material consisting of sulfated esters of physetoleic acid and alcohol of the group of unsaturated aliphatic monohydric alcohols having 8 or more carbon atoms in the molecule. No. 2,079,228. Walther Schrauth, Berlin-Dahlem, Germany, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.
Flash chamber for an oil cracking plant. No. 2,079,333. Ralph M. Parsons, Mt. Vernon, O., to Ralph M. Parsons Co., both of Mt. Vernon, O.
Process and apparatus for desulfurization and conversion of oils of different characteristics into lower boiling point hydrocarbon products. No. 2,079,359. Ernest A. Ocon, New York City.
Carburetor for low grade hydrocarbons. No. 2,079,363. Donald L. J. Smith to Geo. F. Smith, both of Long Beach, Calif.
Treatment acid sludges obtained from acid treatment of petroleum oils, using sulfuric acid in process. No. 2,079,424. Chester L. Read, Jersey City, and Paul J. Harrington, Westfield, N. J., to Standard Oil Development Co., corporation of Del.
Process treating oils; in first step agitating an acid reactive hydrocarbon oil with a sulfuric acid reagent. No. 2,079,443. Stewart C. Fulton, Elizabeth, N. J., to Standard Oil Development Co., corporation of Del.
Method of sealing-off porous formations in wells. No. 2,079,517. Horace Lowry McQuiston, Oklahoma City, Okla., to Phillips Petroleum Co., corporation of Del.
Process separating a hydrocarbon oil-wax mixture into oil and wax fractions containing less wax and oil. No. 2,079,596. Jos. A. Alexander to Atlantic Refining Co., both of Phila., Pa.
Manufacture anti-knock fuel and synthetic resins. No. 2,079,607. Carleton Ellis to Ellis-Foster Co., both of Montclair, N. J.
Method of gasifying liquid hydrocarbon fuel. No. 2,079,632. Enoch Rector, New York City.
Manufacture of esters from olefines. No. 2,079,652. Harold S. Davis and Alfred W. Francis, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.
Process for breaking petroleum emulsions of the water-in-oil type. Nos. 2,079,762-3-4. Melvin De Groote, St. Louis, and Bernhard Keiser, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.
Conversion hydrocarbon oils. No. 2,079,776. LeRoy G. Story, Bronxville, N. Y., to Texas Co., New York City.
Process deodorizing lubricating oils, using sulfur dioxide in process. No. 2,079,782. Alfred A. Wells, Roselle Park, N. J., to Standard Oil Development Co., corporation of Del.
Production lubricant comprising a pure aromatic compound and a high molecular weight soluble aliphatic linear polymer of a monomeric compound having a single double bond capable of improving the viscosity of said compound. No. 2,079,783. Peter J. Wiezevich, Elizabeth, N. J., to Standard Oil Development Co., corporation of Del.
Method refining a hydrocarbon oil containing a plurality of components of varying degrees of paraffinicity and naphthenicity. No. 2,079,885. Vanderveer Voorhees, Hammond, Ind., to Standard Oil Co., Chicago, Ill.
Refining a mineral oil containing paraffinic and naphthenic components and asphalt by treatment with a liquefied normally gaseous hydrocarbon. No. 2,079,886. Vanderveer Voorhees, Hammond, Ind., to Standard Oil Co., Chicago, Ill.
Production high cetene number diesel fuel oil. No. 2,079,887. Vanderveer Voorhees, Hammond, Ind., to Standard Oil Co., Chicago, Ill.
Method refining a lubricating oil containing naphthenic, paraffinic, and asphaltic components. No. 2,079,911. Percy C. Keith, Jr., Peapack, N. J., and Henry O. Forrest, Teaneck, N. J., to Standard Oil Co., Chicago, Ill.
Treatment normally liquid petroleum distillates to improve color and lower the gum-forming tendency thereof. No. 2,079,934. Louis H. Fitch, Jr. and Fred E. Frey, Bartlesville, Okla., First Nat'l Bank in Bartlesville administrator of said Fitch, deceased, assignors to Phillips Petroleum Co., corporation of Del.

Conversion hydrocarbons. No. 2,079,935. Fred E. Frey to Phillips Petroleum Co., both of Bartlesville, Okla.

Method refining cracked oils. No. 2,080,087. Masakichi Mizuta, Marunouchi, Kojimachi-ku, Tokyo, and Teiji Yoshimura, Okubo, Kashiwazaki-machi, Kariha-gun, Nigata-ken, Japan, to Nippon Sekiyu Kabushiki Kaisha, Marunouchi, Kojimachi-ku, Tokyo, Japan.

Method lowering pour point of mineral oils. No. 2,080,088. Franz Rudolf Moser, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Purification alcohols obtained from olefines. No. 2,080,111. Albert H. Bump, Watertown, Mass., to Monsanto Chemical Co., St. Louis, Mo.

Process for cracking petroleum oil. No. 2,080,118. Carbon P. Dubbs, Wilmette, Ill., to Universal Oil Products Co., Chicago, Ill.

Solvent recovery in dewaxing operations. No. 2,080,222. Herbert Lewis Duffy, Sumner, Ill., to Indian Refining Co., Lawrenceville, Ill.

Method recovering natural distillate products from wells. No. 2,080,-351. Jay P. Walker, Tulsa, Okla., and Edwin V. Foran, San Antonio, Texas.

Production unvulcanized and vulcanized compositions, being product of the conjoint polymerization of unsaturated hydrocarbons. No. 2,080,363. Paul Stocklin, Opalden, and Erich Konrad, Leverkusen-I. G., Werk, Germany, to I. G., Frankfort-am-Main, Germany.

Refining liquid hydrocarbon solution of mercaptans by treating solution with an active copper reagent in presence of extraneous gaseous ammonia. No. 2,080,365. Geo. Hugo von Fuchs, Wood River, Ill., and Lawson Elwood Border, Boulder, Colo.

Hydrocarbon oil treatment. No. 2,080,415. Seymour W. Ferris, Aldan, Pa., to Atlantic Refining Co., Phila., Pa.

Apparatus for entraining oil and gas from oil wells. No. 2,080,622. Wm. Fred. McMahon, Riverside, Calif.

Removal sulfur compounds from hydrocarbon oil and regeneration of spent treating agent. No. 2,080,654. Wallace A. Craig, to Wm. C. McDuffie, receiver for Richfield Oil Co. of Calif., both of Los Angeles, Calif.

Production motor fuel comprising cracked gasoline containing non-volatile gum which normally tends to deposit on valves and in cylinders of motors, containing as a gum flux a normally liquid carboxylic hydrocarbon. No. 2,080,681. Jesse Russell Wilson, Chicago, Ill., and Vanderveer Voorhees, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Production petroleum plastics from pitches containing the same. No. 2,080,696. Donald E. Carr, Naples, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Refining hydrocarbon oils, first treating with aqueous hydrogen chloride, finally subjecting vapors to action of a contact material containing zinc and copper. No. 2,080,701. Roland B. Day to Universal Oil Products Co., both of Chicago, Ill.

Apparatus and method of pumping hydrocarbon liquids. No. 2,080,-706. Wm. N. Glab, to Morrison Bros. Co., both of Dubuque, Iowa.

Process heating hydrocarbon oils to the high temperatures required for their conversion. No. 2,080,731. Lev A. Mekler to Universal Oil Products Co., both of Chicago, Ill.

Refining light hydrocarbon distillates by treating same in vapor phase with sulfuric acid to which has been added a hydrocarbon spacing agent. No. 2,080,732. Jacque C. Morrell to Universal Oil Products Co., both of Chicago, Ill.

Art of and apparatus for treating petroleum distillates with alkaline solutions. No. 2,080,737. Donald B. Nutt, El Segundo, and John H. Easthagen, Los Angeles, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Improved process for manufacture gasoline by cracking heavier and higher boiling hydrocarbon oils. No. 2,080,820. Edward W. Isom, Scarsdale, N. Y., to Sinclair Refining Co., New York City.

Production motor fuel comprising cracked hydrocarbon distillates containing a phenylene diamine, with two alkyl groups substituted on one of the amino groups to retard gum formation. No. 2,080,928. Thos. H. Rogers and Vanderveer Voorhees, Hammond, Ind., to Gasoline Antioxidant Co., Wilmington, Del.

Treatment hydrocarbon fluids. No. 2,080,929. James R. Rose, Edgeworth, Pa., three-fourths to Michael L. Benedum and Jos. C. Trees, both of Pittsburgh, Pa.

Apparatus for treatment hydrocarbon fluids. No. 2,080,930. James R. Rose, Edgeworth, Pa., three-fourths to Michael L. Benedum and Jos. C. Trees, both of Pittsburgh, Pa.

Process and apparatus for treatment hydrocarbon fluids. No. 2,080,931. James R. Rose, Edgeworth, Pa., three-fourths to Michael L. Benedum and Joseph C. Trees, both of Pittsburgh, Pa.

Apparatus for treatment hydrocarbon fluids. No. 2,080,932. James R. Rose, Edgeworth, Pa., three-fourths to Michael L. Benedum and Jos. C. Trees, both of Pittsburgh, Pa.

Treatment aliphatic hydrocarbons. No. 2,080,933. James R. Rose, Edgeworth, Pa., three-fourths to Michael L. Benedum and Joseph C. Trees, both of Pittsburgh, Pa.

Process for breaking petroleum emulsions of the water-in-oil type. No. 2,081,003. Melvin De Groote, St. Louis, and Bernhard Keiser, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.

Processes for breaking petroleum emulsions of the water-in-oil type. Nos. 2,081,004-5. Melvin De Groote, St. Louis, and Arthur F. Wirtel, Kirkwood, Mo., to Tretolite Co., Webster Groves, Mo.

Liquid lubricating oil composition comprising a petroleum lubricating oil and calcium phenyl stearate. No. 2,081,075. Arnold G. Vobach, Whiting, Ind., to Sinclair Refining Co., New York City.

Process inhibiting gum formation in combustible gaseous fuels containing unsaturated organic compounds, by dispersing a fog of oil containing an antioxidant into fuel. No. 2,081,130. Harold V. Atwell, White Plains, N. Y., to Standard Oil Co., Chicago, Ill.

Process deasphalting and dewaxing petroleum oils. No. 2,081,174. Carleton Ellis, Montclair, N. J., to Standard Oil Development Co., corp. of Del.

Production fuel oil of less than 40 sec. viscosity Saybolt. No. 2,081,-176. Amiot P. Hewlett, Cranford, and Chas H. Cole, Roselle Park, N. J., to Standard Oil Development Co., corp. of Del.

Dehydrating lower aliphatic alcohols miscible with water; using saturated aqueous solution of pearlash in process. No. 2,081,189. Peter J. Wiezevich, Elizabeth, N. J., to Standard Oil Devolopment Co., corp. of Del.

Process gum-stabilizing motor fuel. No. 2,081,218. Robt. E. Burk, to Standard Oil Co., both of Cleveland, O.

Apparatus for chilling oils in order to precipitate matter therefrom. No. 2,081,287. Blair G. Aldridge to Union Oil Co. of Calif., both of Los Angeles, Calif.

Method and apparatus for continuous filtration. No. 2,081,296. Earle W. Gard, Palos Verdes Estates, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Method improving sour petroleum oil by first contacting oil with a copper sweetening reagent. No. 2,081,309. Walter A. Schulze to Phillips Petroleum Co., both of Bartlesville, Okla.

Conversion hydrocarbon oils. No. 2,081,342. Kenneth Swartwood to Universal Oil Products, Co., both of Chicago, Ill.

Conversion hydrocarbon oils. Nos. 2,081,347-8. Chas. H. Angell to Universal Oil Products Co., both of Chicago, Ill.

Method increasing anti-knock value of gasoline containing a hydrocarbon of the benzene series. No. 2,081,357. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago, Ill.

Process dewaxing liquid hydrocarbons. No. 2,081,403. Hans Olaf Lindgren, Appelviken, Sweden, to De Laval Separator Co., New York City.

Purification naphthenic acids contaminated with carbonaceous materials, using sulfuric acid in process. No. 2,081,475. Donald E. Carr, Naples, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Separation paraffinic from non-paraffinic fractions of a hydrocarbon oil mixture. No. 2,081,494. David R. Merrill, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Solvent extraction lubricating oils. No. 2,081,495. David R. Merrill, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Production petroleum plastics from petroleum-containing mineral oil. No. 2,081,496. David R. Merrill, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Separation paraffinic and non-paraffinic fractions in an oil containing the same. No. 2,081,497. David R. Merrill, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Extraction mineral oils with basic selective solvents. No. 2,081,498. David R. Merrill, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Lowering pour point of oil. No. 2,081,518. Maner L. Wade, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Separation wax from a wax-containing oil. No. 2,081,519. Maner L. Wade, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Separation of petroleum fractions into their constituent components by means of a selective solvent. No. 2,081,524. Chas. Douglas Barnes, Long Beach, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Art of cracking mineral oils. No. 2,081,534. Chauncey B. Forward, deceased, late of Urbana, O., by Laura W. Forward, executrix, Urbana, O., to Forward Process Co., Dover, Del.

Solvent extraction processes. Nos. 2,081,719-20. Willem J. D. van Dijck, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.

Extraction liquid solution of two components containing at least one organic polar compound with a selective solvent. No. 2,081,721. Willem J. D. van Dijck and Alex. W. J. Mayer, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.

Production lubricating oil. No. 2,081,731. Ulric B. Bray to Union Oil Co. of Calif., both of Los Angeles, Calif.

Dewaxing oils. No. 2,081,732. Ulric B. Bray, Palos Verdes Estates, and Donald E. Carr, Naples, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Method treating oils. No. 2,081,734. Ulric B. Bray, Palos Verdes Estates, Calif., to Union Oil Development Co., Los Angeles, Calif.

Method increasing lubricating oil yields. No. 2,081,855. Fred G. Fellows to Continental Oil Co., both of Ponca City, Okla.

Recovery of solvents from oil. No. 2,081,884. Edward N. Roberts, Casper, Wyo., to Standard Oil Co., Chicago, Ill.

The combination, with a highly refined viscous mineral oil, of dibenzyl disulfide to reduce tendency of the oil to form acidic material through oxidation. No. 2,081,886. Bertrand W. Story and Everett W. Fuller, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Process and apparatus for heating fluids. Nos. 2,081,970 and 2. Jos. G. Alther to Universal Oil Products Co., both of Chicago, Ill.

Heating hydrocarbon oils to cracking temperatures. No. 2,081,971. Jos. G. Alther to Universal Oil Products Co., both of Chicago, Ill.

Method of heating fluids. No. 2,081,973. Jos. G. Alther to Universal Oil Products Co., both of Chicago, Ill.

Manufacture lower aliphatic anhydrides. No. 2,081,988. Henry Dreyfus, London, England.

Concentration dilute aliphatic acids. No. 2,082,000. Clifford I. Haney, Drummondville, Que., Canada, to Celanese Corp. of America, corp. of Del.

Manufacture high viscosity index lubricating oils. Nos. 2,082,203-4. Elmslie W. Gardiner, John W. Greene, and Arthur L. Lyman, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Treatment hydrocarbon oils. No. 2,082,224. Harold R. Snow, Neodesha, Kans., to Standard Oil Co. (Ind.), Chicago, Ill.

Method sweetening a petroleum oil; mixing oil with an aqueous alkaline plumbate solution. No. 2,082,331. Frank Gardner, Dallas, Texas.

Polymerization of gaseous olefins. No. 2,082,454. Ward E. Kuentzel, Whiting, and Robert F. Ruthrauff, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Polymerization of olefinic gases containing olefinic hydrocarbons having molecular weight greater than that of ethylene. No. 2,082,500. Ward E. Kuentzel, Whiting, Ind., to Standard Oil Co., Chicago Ill.

Catalytic polymerization and polymerization catalysts. No. 2,082,518. Robt. F. Ruthrauff, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Olefin polymerization. No. 2,082,519. Robt. F. Ruthrauff, Whiting, Ind., to Standard Oil Co., Chicago, Ill.

Conversion hydrocarbon gases to liquids. No. 2,082,520. Robt. F. Ruthrauff, Hammond, and Ward E. Kuentzel, Whiting, Ind., to Standard Oil Co., Chicago, Ill.

Pyrolytic treatment hydrocarbons. No. 2,082,636. Percy C. Keith, Jr., Port Washington, N. Y., to Gasoline Products Co., Inc., Newark, N. J.

Treatment hydrocarbon oil. No. 2,082,637. Percival C. Keith, Jr., Port Washington, N. Y., to Gasoline Products Co., Inc., Newark, N. J.

Removal dispersed residual blackstrap from a plumbite sweetened hydrocarbon oil, using an aqueous alkaline solution in process. No. 2,082,787. Arthur E. Birch, Lansdowne, Pa., to Atlantic Refining Co., Phila., Pa.

Production high octane gasoline in a once through operation. No. 2,082,801. Eugene J. Houdry, Woodbury, N. J., to Houdry Process Corp., Dover, Del.

Art of cracking hydrocarbons. No. 2,083,120. Edward W. Isom, Scarsdale, N. Y., to Sinclair Refining Co., New York City.

Treatment hydrocarbon oils. No. 2,083,212. Jos. G. Alther to Universal Oil Products Co., both of Chicago, Ill.

Process for breaking petroleum emulsions of the water-in-oil type. No. 2,083,220. Melvin De Groote, St. Louis, Mo., and Bernhard Keiser, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.

Processes for breaking petroleum emulsions of the water-in-oil type. Nos. 2,083,221-2-3-4-5. Melvin De Groote, St. Louis, Mo., to Tretolite Co., Webster Groves, Mo.

Preparation non-sludging lubricating oil having a low true color, from a mineral oil. No. 2,083,247. Kenneth Taylor, Chicago, Ill., and Bernard H. Shoemaker, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Separation liquid paraffinic components from naphthenic components of hydrocarbon oils. No. 2,083,250. Vanderveer Voorhees, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Method refining hydrocarbons with an oxidizing agent. No. 2,083,253. Issar Budowski, Paris, France.

Preparation carbocyclic compounds containing acid salt-forming groups. No. 2,083,482. Adolf Steindorff, Gerhard Balle, and Paul Heimke, Frankfort-am-Main, and Karl Horst, Hofheim-am-Taunus, Germany, to I. G., Frankfort-am-Main, Germany.

Oil refining apparatus. No. 2,083,511. Malcolm H. Tuttle, New Rochelle, N. Y., to Max B. Miller & Co., Inc., New York City.

Pigments, Dry Colors & Fillers

Production light precipitated non-colloidal chalk, by producing a fine mist of milk of lime in an atmosphere rich in carbon dioxide. No. 2,081,112. Noel Statham, Irvington, N. Y., and Thos. G. Leek, Covington, Va., to West Virginia Pulp & Paper Co., New York City.

Manufacture blanc fixe. No. 2,081,835. James B. Pierce, Jr., to Barium Reduction Corp., both of Charleston, W. Va.

Production zirconium opacifying pigment, consisting of a stable, readily powdered crystalline complex silicate containing zirconium oxide. No. 2,083,024. Chas. J. Kinzie, John A. Plunkett, and Chas. H. Commons, Jr., Niagara Falls, N. Y., to Titanium Alloy Mfg. Co., New York City.

Manufacture white lead pigment. No. 2,082,032. Royal L. Sessions to Hughes-Mitchell Processes, Inc., both of Denver, Colo.

Resins, Plastics, etc.

Production furfural by reacting a furfural-yielding material with a suitable acid. No. 2,078,241. Ellis I. Fulmer, Leo. M. Christensen, and Ralph M. Hixon, Ames, Iowa, to Chemical Foundation, Inc., New York City.

Reaction product of gallic acid and a soluble tungsten compound, said product being highly plastic. No. 2,078,609. Aladar Pacz, Weehawken, N. J.

Plastic adhesive composition that will not stick to cold laminating rolls, comprising asphalt, pitch, gilsonite, and slate. No. 2,078,727. James J. Jackson, Woodbury, N. J., to Paulsboro Mfg. Co., Paulsboro, N. J.

Production phenol-aldehyde condensation products. No. 2,079,210. Herbert Honel, Vienna, Austria, to Helmuth Reichhold, Detroit, Mich., doing business as Reichhold Chemicals.

Production molded bodies, first preparing molding composition by intimately mixing an aromatic amine with powdered carbonic fuel, resulting product being hard, heat-resistant and having high electrical insulating properties. No. 2,079,343. Franz Fischer and Otto Horn to Studien und Verwertungs-Gesellschaft m. b. H., all of Mulheim-on-Ruhr, Germany.

Production heat sealable, moisture-proof, non-porous, non-fibrous, wrapping tissue having good surface slip and storage characteristics, comprising a non-porous, non-fibrous base and a coating containing pyroxylin, nitrogen, a wax, a blending agent, and a plasticizer. No. 2,079,379. James A. Mitchell, Kenmore, N. Y., to du Pont, Wilmington, Del.

Moisture-proofing composition suitable for use in producing a transparent, non-fibrous wrapping tissue, containing a cellulose derivative, a wax, and a compound which is solid at room temperature. No. 2,079,-395. Hamilton Bradshaw to du Pont, both of Wilmington, Del.

Production resinous compositions, consisting of a phenol, an aldehyde, and a polyhydric alcohol. No. 2,079,606. Alan Ashby Drummond, Gerrards Cross, and Howard Houlston Morgan, Slough, England, to Imperial Chemical Industries, Ltd., London, England.

Resinous coating compositions, heating polyhydric alcohol in presence of basic catalyst with a varnish, finally heating resulting product with polycarboxylic acid. No. 2,079,616. Horace S. Hopkins, Springfield, Henry Lyne Plummer, Phila., and Leslie Field Stone, Rutledge, Pa., to du Pont, Wilmington, Del.

Formation solutions of heat-hardening unmodified phenol-formaldehyde resins capable of being blended with fatty oil. No. 2,079,633. Henry S. Rothrock to du Pont, both of Wilmington, Del.

Cementing cellulosic plastics. No. 2,079,641. James F. Walsh, So. Orange, and Amerigo F. Caprio, Newark, N. J., to Celluloid Corp., corporation of N. J.

Cementing cellulose plastics. No. 2,079,642. James F. Walsh, So. Orange, Harry E. Smith and Amerigo F. Caprio, Newark, N. J., to Celluloid Corp., corporation of N. J.

Production an adherent, thermoplastic acid-resisting composition, possessing some flexibility and freedom from tendency to crack, adapted for luting and jointing. No. 2,079,756. Chas. Rutland Barsby, Liverpool, and Harvey Richard Lyle Streight, Runcorn, England, to Imperial Chemical Industries, Ltd., London, England.

Production artificial resin; condensing a phenol, an aldehyde, an organic salt of zinc, and a polyhydric alcohol, in presence of a natural resin. No. 2,079,926. Israel Rosenblum, Jackson Heights, N. Y.

Manufacture plastic and method of curing same; composed of an olefin polysulfide reaction product which has been heat treated in presence of a reagent. No. 2,079,944. Geo. Spencer Lobdell, Rome, N. Y., to General Cable Corp., New York City.

Manufacture plastic articles by depositing a solution of plastic material containing a solvent and a non-solvent on a suitable forming surface and coagulating the material by removing the solvent and non-solvent by an extracting agent. No. 2,080,051. Alfred Dominique Germain Landucci, Paris, France, to Eastman Kodak Co., Jersey City, N. J.

Molding composition material made by steaming ligno-cellulose material. No. 2,080,078. Wm. H. Mason, Robt. M. Boehm, and Wilbur Euclid Koonce to Masonite Corp., all of Laurel, Miss.

Production synthetic resin, comprising reaction product of an alcohol and an acidic composition, maleic anhydride and a compound containing the abietyl radical. No. 2,080,436. Ernest G. Peterson to Hercules Powder Co., both of Wilmington, Del.

Process separating an after-chlorinated polyvinylchloride from its solutions in tetrachlorethane. No. 2,080,589. Georg Wick, Bitterfeld, Germany, to I. G., Frankfort-am-Main, Germany.

Esters of terpene and abietyl compounds adapted for use as solvents, plasticizers, etc. No. 2,080,752. Kyle Ward, Jr., to Hercules Powder Co., both of Wilmington, Del.

Process for injection molding of plastics. No. 2,080,783. Arthur E. Petersen, Westfield, N. J., to Celluloid Corp., corporation of N. J.

Production synthetic resin; reacting a phenol-aldehyde-organic salt of zinc-rosin reaction mass with a polyhydric alcohol partially neutralized with a carboxylic aromatic acid. No. 2,081,153. Israel Rosenblum, Jackson Heights, N. Y.

Production artificial resin suitable as a vehicle for white baking enamels, using glycerol, phthalic and linoleic acids, a dicarboxylic aliphatic acid, and boric acid. No. 2,081,154. Israel Rosenblum, Jackson Heights, N. Y.

Condensation product of castor oil with half ester of maleic acid. No. 2,081,266. Herman A. Bruson, Germantown, Pa., to Resinous Products & Chemical Co., Inc., Phila., Pa.

Method purifying a heavy oily substance produced in resin manufacture. No. 2,081,448. Wm. H. Carmody, Pittsburgh, Pa., to Neville Co., corp. of Penna.

Method forming decorated laminated article. No. 2,081,538. Fred J. Hoarle, Newark, N. J., to Celluloid Corp., corp. of N. J.

Applicator for plastic materials. No. 2,081,673. Gordon L. Olson, Arlington, Mass.

Resinous plastic material: the condensation product of terpine and a member of the group consisting of maleic anhydride and maleic acid. No. 2,081,753. Edwin R. Littmann to Hercules Powder Co., both of Wilmington, Del.

Non-crystallizing rosin product, comprising a crystallizable rosin containing a synthetic resin. No. 2,081,889. Jos. N. Borglin to Hercules Powder Co., both of Wilmington, Del.

Method refining rosin, using a boron compound in process. No. 2,081,-890. Jos. N. Borglin to Hercules Powder Co., both of Wilmington, Del.

Plastic sealing composition comprising a metallic powder, a natural resin, and a non-drying oil. No. 2,082,016. Byron V. McBride, Irwin, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Method insulating an electrical conductor; using gum rubber, a plasticizer, and a hard phenol condensation product in process. No. 2,082,-027. Jos. C. Rah to Delta-Star Electric Co. both of Chicago, Ill.

Preparation tertiary alkyl phenols. No. 2,082,044. Clayton M. Beamer, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Manufacture potentially reactive nitrogenous condensation products. No. 2,082,306. Theodor Sutter to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Process and apparatus for manufacture of films and foils from cellulose derivatives, resins, and other plastic substances. No. 2,082,486. Gennady Frenkel, Surbiton, England.

Preparation vinylethinyl derivatives. No. 2,082,568. Wallace H. Carothers, Arden, and Gerard J. Berchet, Wilmington, Del., to du Pont, Wilmington, Del.

Production vinylethinyl derivatives. No. 2,082,569. Wallace H. Carothers and Ralph A. Jacobson, Arden, Del., to du Pont, Wilmington, Del.

Method and apparatus for cutting cords of plastic material into predetermined lengths. No. 2,082,833. Albertus Hendrik Haupt, Somerset West, Union of So. Africa, to Imperial Chemical Industries, Ltd., London, England.

Preparation laminated structure, embodying a coumarone resin as impregnating material, by superimposing and compressing a plurality of impregnated laminae. No. 2,082,854. Leslie Thompson Sutherland, Yonkers, N. Y., to Barrett Co., New York City.

Production coated leather of the patent leather type. No. 2,083,040. Ralph C. Shuey, Mountain Lakes, N. J., to Bakelite Corp., New York City.

Resinous composition comprising a heat-hardenable phenol-aldehyde condensation product, a chlorinated naphthalene, and triaryl phosphate. No. 2,083,063. Norman D. Hanson, Bloomfield, N. J., to Bakelite Corp., New York City.

Apparatus for heat hardening synthetic resins. No. 2,083,423. Frank I. Bennett, Jr., Highland Park, N. J., to Revolite Corp., New Brunswick, N. J.

Rubber

Apparatus for latexing cords. No. 2,077,492. Norman J. Ritzert to Dayton Rubber Mfg. Co., both of Dayton, O.

Preserving rubber by incorporating a 1:5-naphthalene diamine. No. 2,077,502. Ira Williams, Woodstown, and Wm. A. Douglass, Penns Grove, N. J., and Arthur M. Neal, Wilmington, Del., to du Pont, Wilmington, Del.

Removal rubber material from metal by immersion in a bath of lubricating oil. No. 2,077,785. Geo. B. Watkins to Libbey-Owens-Ford Glass Co., both of Toledo, O.

Preservation rubber by incorporating therein an N N′ diaryl arylene diamine. No. 2,078,527. Albert M. Clifford, Stow, O., to Wingfoot Corp., Wilmington, Del.

Preservation rubber by incorporating therein a hydroxy diphenyl amine. No. 2,078,528. Albert M. Clifford, Stow, O., to Wingfoot Corp., Wilmington, Del.

Production halogenated products of rubber, etc. No. 2,078,545. Otto Schweitzer, Frankfort-am-Main-Hochst, Germany, to Metallgesellschaft Aktiengesellschaft, Frankfort-am-Main, Germany.

Apparatus and method for processing rubber. No. 2,078,777. James W. Schade, Akron, O., to B. F. Goodrich Co., New York City.

Method bonding cured rubber to a base; by treatment with a solution of bromine in a solvent, then bonding treated surface of rubber to base by a thermo-setting resin. No. 2,078,918. James A. Merrill, Akron, O., to Wingfoot Corp., Wilmington, Del.

Method bonding cured rubber to a base; by treatment with a solution of a halide of an amphoteric metal in a solvent, then bonding treated surface to base by a thermo-setting resin. No. 2,078,911. James A. Merrill, Akron, O., to Wingfoot Corp., Wilmington, Del.

Method attaching rubber to metal; article comprising a ferrous base, a bronze coating, and a rubber layer vulcanized on said coating. No. 2,078,917. John Gilbert Malone, Detroit, Mich., to United States Rubber Co., New York City.

Method reclaiming rubber from waste rubber products. No. 2,079,489. Robt. M. Cole, Bryn Athyn, Pa.

Re-enforced rubber article having embedded therein strengthening cellulose threads. No. 2,080,002. John L. Bitter, Elizabethton, Tenn., to No. American Rayon Corp., New York City.

Production crepe effects on silk; printing fabric with an aqueous emulsion of the class consisting of waxes and soaps, subjecting to a shrinking agent, finally removing the resist. No. 2,080,509. Andre Schoen, Hackensack, N. J., to Reconstruction Finance Corp., New York City.

Dispersion of chloro-2-butadiene-1,3 polymer dispersed in a liquid of the group of glycerin and ethylene glycol and formamide. No. 2,080,-558. Wallace Hume Carothers to du Pont, both of Wilmington, Del.

Production cement comprising in its unset state a tacky solution of a rosinate of a metal of the alkaline earth group, rosin, rubber, and a rubber depolymerization and oxidation catalyzer. No. 2,080,730. Willett J. McCortney, Royal Oak, Mich., to Chrysler Corp., Detroit, Mich.

Removal rubber from rubber-containing materials by treatment with an alkyl nitrite. No. 2,080,910. Kenneth W. Coons, Hamburg, N. Y., to National Aniline & Chemical Corp., Inc., New York City.

Preparation latex concentrate having water content of less than 40% and being free from air inclusions. No. 2,081,556. Alfred E. Peterson, Frankfort-am-Main, and Wilhelm Gensecke, Gonzenheim, near Frankfort-am-Main, Germany, to Metallgesellschaft Aktiengesellschaft, Frankfort-am-Main, Germany.

Rubber preservation, using diphenyl amine, sodium diphenyl amine, and ethylene dichloride. No. 2,081,613. Thos. W. Bartram, Nitro, W. Va., to Monsanto Chemical Co., St. Louis, Mo.

Process and apparatus for vulcanization of rubber goods, and treatment of other goods requiring heat and pressure. No. 2,081,670. Alex. Johnston, Edinburgh, Scotland, to North British Rubber Co., Ltd., both of Edinburgh, Scotland.

Manufacture rubber products; mixing dry rubber dust with dry compounding ingredients and a vulcanizing agent, plastifying mixture by compression and vulcanizing. No. 2,082,304. Martinus Joannes Stam, The Hague, Netherlands.

Antioxidants; method preserving rubber by treatment with 2,4,2',4' tetramino 5,5' dimethyl diphenyl methane. No. 2,082,525. Arthur W. Sloan, Akron, O., to B. F. Goodrich Co., New York City.

Apparatus for manufacture of articles direct from latex solution. No. 2,083,211. Sterling W. Alderfer, one-half to Edw. D. Andrews, both of Akron, O.

Textile, Rayon

Apparatus for equalizing dyeing qualities of artificial filaments. No. 20,356. Reissue. Richard Elssner, Elizabethton, and Ralph H. Carter, Johnson City, Tenn., to North American Rayon Corp., New York City.

Production coated creped fabric. No. 2,077,438. Wm. Wallace Rowe, Cincinnati, O., to Paper Service Co., Lockland, O.

Production continuous fibrous yarn derived from a bundle of continuous filaments. No. 2,077,441. Matthew Michael Taylor and Stephen Miller Fulton, Spondon, near Derby, England, to Celanese Corp. of America, corporation of Del.

Production cellulosic artificial silk filaments or threads characterized by subdued or low luster and having a finely divided completely halogenated ring hydrocarbon compound uniformly distributed throughout. No. 2,077,699. Emil Kline, Buffalo, N. Y., to du Pont, Wilmington, Del.

Production rayon having subdued luster, containing finely divided deca chlorodiphenyl uniformly distributed throughout. No. 2,077,700. Emil Kline, Buffalo, N. Y., to du Pont, Wilmington, Del.

Process spinning artificial silk from viscose. No. 2,078,339. Hugo Pfannenstiel and Werner Matthaes, Dessau-in-Anhalt, Germany, to I. G., Frankfort-am-Main, Germany.

Production spun yarn from wool fibers and artificial fibers containing organic derivatives of cellulose, using a lubricant comprising a mineral oil, a caustic material, a fatty acid, and an alcohol, in kerosene as a carrier. No. 2,078,886. Leon W. Weinberg, Phila., Pa., to Celanese Corp. of America, corporation of Del.

Apparatus for opening staple fibers. No. 2,079,094. Wm. Whitehead and Albert W. Keight, Cumberland, Md., to Celanese Corp. of America, corporation of Del.

Textile process; materials containing a partial higher fatty acid ester of a polyhydric alcohol. No. 2,079,108. Camille Dreyfus, New York City, and Wm. Whitehead, Cumberland, Md., to Celanese Corp. of America, corporation of Del.

Production filaments, threads, etc., from solutions containing organic derivatives of cellulose. No. 2,079,109. Henry Dreyfus, London, England.

Production filaments, etc. No. 2,079,133. Wm. Ivan Taylor, Spondon, near Derby, England, to Celanese Corp. of America.

Machine for testing wearing qualities of fabrics. No. 2,079,501. Floyd E. Bartell, Ann Arbor, Mich.

Manufacture artificial threads. No. 2,079,524. Rene Picard, Villeurbanne, France, to du Pont, Wilmington, Del.

Production effects on textiles containing cellulose acetate, by applying composition consisting of an effect material, and a water-soluble thickening agent in a medium consisting of camphor, xylene monomethyl sulfonamide, acetone, denatured alcohol, and butyl acetate. No. 2,079,604. Wm. Alexander Dickie and Ernest Leslie Greenwood, Spondon, near Derby, England, to Celanese Corp. of America, corporation of Del.

Production pattern effects on pile fabrics, the pile of which contains cellulose acetate. No. 2,079,629. Herbert Platt, Cumberland, Md., to Celanese Corp. of America, corporation of Del.

Method improving properties of yarns, etc., by incorporating therein an organic material comprising a salt of an aliphatic amine. No. 2,079,643. Wm. Whitehead, Cumberland, Md., to Celanese Corp. of America, corporation of Del.

Printing textile fibers with vat dyestuffs, using in process a water-soluble sulfate of an alcohol. No. 2,079,788. Ivan Fleming Chambers to du Pont, both of Wilmington, Del.

Manufacture crush resistant pile fabrics; reacting a regenerated cellulose pile of a fabric with formaldehyde. No. 2,080,043. Winfield Walter Heckert, Ardentown, Del., to du Pont, Wilmington, Del.

Apparatus for packaging artificial silk. No. 2,080,185. Ferdinand Rathgeber, Ede, Netherlands, to American Enka Corp., Enka, N. C.

Apparatus for treatment artificial silk. No. 2,080,193. Wm. Bakker, Arnhem, Netherlands, to American Enka Corp., Enka, N. C.

Coloration textiles containing organic derivatives of cellulose with a dyestuff having a low affinity for the cellulose. No. 2,080,254. Camille Dreyfus, New York City, Geo. W. Miles, Boston, Mass., and Herbert Platt, Cumberland, Md., to Celanese Corp. of America, corporation of Del.

Device for mercerizing cellulose fibers. No. 2,080,635. Walther Schramek, Dresden, and Carl Schubert, Gronau, Germany, to Baumwollspinnerei Gronau, Gronau, Germany.

Manufacture yarns and fabrics of cellulose derivatives; using an alkylolamine salt of a fatty acid in process. No. 2,080,755. Wm. Whitehead, Cumberland, Md., to Celanese Corp. of America, corporation of Del.

Manufacture and treatment artificial filaments, etc., treating same with an aqueous solution of a strong mineral alkali in presence of a salt of an amino acid. No. 2,080,768. Geo. Holland Ellis, Robt. Wighton Moncrieff, and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, corporation of Del.

Manufacture thread-like elements, using cellulose esters and a gelatinizing solution in process. No. 2,080,905. Floyd E. Bartell, Ann Arbor, Mich., to G. E. Wilder, Wm. A. Defnet, Sherwood Field, J. Hugo Smith, Frank MacKenzie, Yellott F. Hardcastle, D. Kenneth Laub, Duncan J. McNabb, and Stanley V. Laub, all of Detroit, Mich.

Production film-forming solutions by first reacting on a urea with a solution of formaldehyde. No. 20,383. Reissue. Kurt Ripper, Berlin, Germany, to American Cyanamid Co., New York City.

Formation artificial materials; extruding into a coagulating medium a solution containing two varieties of cellulose acetate. No. 2,081,144. Henry Dreyfus, London, England.

Artificial film containing derivatives of cellulose. No. 2,081,155. Geo. Schneider, Montclair, N. J., to Celanese Corp. of America, corporation of Del.

Manufacture artificial materials by wet spinning processes from solutions of cellulose acetate, using acetic acid and ethyl lactate in process. No. 2,081,169. Wm. Alex. Dickie and Percy Frederick Combe Sowter, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Manufacture artificial materials. Nos. 2,081,171-2-3. Henry Dreyfus, London, England.

Production water-soluble size upon cellulosic rayon fibers, using size obtained by mixing a urea compound with an aldehyde in presence of a water-soluble soap. No. 2,081,180. Henry Leupold, Nutley, N. J., to National Oil Products Co., Harrison, N. J.

Process improving wetting capacity of mercerizing lyes, adding to lye an alkali metal salt of an acid. No. 2,081,528. Karl Brodersen, Dessau in Anhalt, Germany, to I. G., Frankfort-am-Main, Germany.

Preparation cellulosic spinning solutions and soft luster products. Nos. 2,081,847-8-9. Thos. H. Byron and Rudolph S. Bley, Elizabethton, Tenn., to North American Rayon Corp., New York City.

Apparatus for producing staple fibers from continuous filaments. No. 2,081,997. Frank Corbyn Hale and Geo. Crawford Tyce, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Process and apparatus for manufacture of tubular structures of artificial materials. No. 2,082,720. Georg Eugen Rutishauser to Lonza Elektrizitatswerke und Chemische Fabriken Aktiengesellschaft, both of Basel, Switzerland.

Manufacture wool substitute from viscose. No. 2,082,814. Walther Zetzsche and Hermann Faber, Premnitz, Germany, to I. G., Frankfort-am-Main, Germany.

Production dull-lustre artificial filaments; adding to viscose spinning solution, prior to extrusion, a mixture of zirconium oxide, paraffin oil, and pine oil. No. 2,083,041. Johann Joseph Stoeckley and Richard Bartunek, Teltow, near Berlin, Germany, to North American Rayon Corp., corp. of Del.

Manufacture artificial filaments, etc., having a basis of organic cellulose derivatives capable of being colored with improved fastness with coloring materials normally liable to fade under acidic conditions. No. 2,083,122. Henry Chas. Olpin and Geo. Holland Ellis, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Production artificial thread using viscose solution in process. No. 2,083,252. Wm. Henry Bradshaw, Buffalo, and Geo. Preston Hoff, Kenmore, N. Y., to du Pont, Wilmington, Del.

Apparatus for supplying spinning solutions to artificial silk spinning machines. No. 2,083,512. Gotthard Bauriedel, Wuppertal-Barman, and Fritz Heger, Wuppertal-Oberbarmen, Germany, to American Bemberg Corp., New York City.

Water, Sewage Treatment

Process and apparatus for treating sewage sludge. No. 2,080,780. James C. Mars, New York City.

Method of and apparatus for sewage sludge digestion. No. 2,081,039. Herman Joseph Nicolaas Hubert Kessener, The Hague, Netherlands, to Dorr Co., Inc., New York City.

Sewage sludge digester. No. 20.377. Reissue. Franz Fries, Essen-Bredeney, Germany.

Water softening system. No. 2,082,623. David B. Gauss, to H. L. G. Co., both of Kalamazoo, Mich.

Method of and apparatus for treatment sewage. No. 2,082,759. Jas. Donald Walker to American Well Works, both of Aurora, Ill.

Miscellaneous

New German process enabling smelting of pyrite cinders with high zinc content in blast furnaces reported by U. S. Consul Sydney B. Redecker, Frankfort-on-Main. Discovery promises to increase German domestic supply of raw material base for iron and zinc.

Self-heating Plastic

Alphide, self-heating thermoplastic material, which requires no elaborate dies or high pressures to mold, is announced by Standard Plastics Corp. Material has good dielectric properties, but is not recommended where precision is important. It may be drilled, sawed or turned like cast resins and can be molded in any shape.

Non-Slipping Belt Pulleys

Condensation of phenol and formaldehyde, carried to a point at which the resin will envelop but not impregnate a fibrous textile filler, results in a composition with a roughened surface useful for a variety of mechanical applications, such as non-slip pulleys. *Research & Invention*, May, 1937.

Month's New Dyes

General Dyestuff: Supranol Scarlet FG, a homogeneous acid dye, produces exceptionally bright scarlet shades on wool or silk, of good fastness to washing, light, and salt water. Raynise A, auxiliary of I.G., for sizing acetate warp beams in the open width. It is easily removed with hot water.

A Technical A. B. C. of Emulsions

By Harvey L. Foxx

Research Dept., The Beacon Co.

NOT so very long ago the production of stable emulsions was in that stage where the proper incantations were of primary importance. Luck was sometimes an essential ingredient. Commercial workers expected a high mortality rate and their expectations were fully realized. In some plants a loss of one batch in five was common.

A vast amount of research has been done on colloids in general; and with the information obtained through this research available for commerce, there is little reason for failures. Since an emulsion is essentially a colloidal phenomenon, it is perhaps advisable to review the more important properties of colloidal systems, so that the properties of, and the reasons for the various manipulations of emulsions may be better understood.

The colloidal system comprises essentially two mutually insoluble phases—in general, a fluid medium in which there are dispersed a number of discrete particles. Hence the names of the phases—disperse and dispersed, sometimes called continuous and discontinuous. This type of system possesses very special properties, due largely to the dispersed phase whose particles are colloidal in size That is to say, their magnitude lies somewhere in the range between the truly molecular (about the size of a molecule of oxygen) and the smallest particles that can be seen with the most powerful of present day microscopes. There is, of course, relatively considerable latitude between the upper and lower limits of size; and, in general, particles of many magnitudes occur in the same colloids.

A good many colloids will look like true solutions if transparency is a criterion. However, the particles being larger than molecular in size will reflect light. If a seemingly transparent colloid is placed in a glass vessel and a strong beam of light is projected through it, then the beam will be visible as a luminous path through the liquid. This is known as the Tyndall effect, and is due to the cumulative reflections of the light from the surfaces of the individual particles. If the same light is projected through a solution of sodium chloride for example, the beam will not be visible in the solution. A greater refinement of this experiment is the Zsigmondy-Siedentopf slit-ultramicroscope. It enables the observer to examine individual particles; and it is with this instrument that the well-known Brownian movement was thoroughly investigated.

Since the particles approach molecular size, it would be expected that the constant movement of the molecules of which the dispersing medium is composed, should be in some degree reflected on their motion. This is found to be the case. In the ultra-microscope, one single particle can be singled out of a very dilute dispersion, and its movements can be watched by the light reflected from its surface, the particle itself, of course, being too small to be seen. The particles are found to be in constant and vigorous erratic motion, due to the impacts of the molecules surrounding them. Thus, the movements of the molecules, reflected in a measure by the movement of the colloidal particles, are in a sense made visible. The fact that gravitation or difference in specific gravity does not precipitate the dispersed particles is evidently, at least in part, due to the continuous bombardment of the surrounding molecules which tends to help them in suspension.

Colloids cannot be separated from salt solutions by ordinary filtration since their component particles are smaller than the interstices in an ordinary filter and pass through readily. There is a way to separate them, however, a process known as dialysis. If a mixture of a salt solution and a colloid are placed in contact with an animal or parchment membrane on the other side of which is pure water, the dissolved salt will diffuse through readily while the colloid will remain behind. The openings in the membrane, while large compared to the ultimate particles of the dissolved salt, are smaller than the colloidal particles.

Another interesting and useful property of certain types known as suspensoid colloids depends upon the fact that the dispersed phase is electrically charged, sometimes positively, and sometimes negatively. The charge is due to the fact that the individual particles absorb on their surfaces some of the ions present in the dispersing medium. These colloids will exhibit the phenomenon known as cataphoresis. If the suspensoid colloid is subjected to an electric field, the charged particles will migrate to the pole of opposite charge and there be precipitated out of suspension. This fact has become very useful in the elimination of smoke nuisances and in the recovery of valuable dust in combustion processes, for smoke is a sort of colloid and can be charged and precipitated by an electric field. From the foregoing can be deduced an additional factor governing the stability of colloids. It is evident that, since the particles in the suspensoid colloid are all similarly charged, they will repel each other on approach, thus tending to minimize collision and subsequent coagulation and precipitation.

Distinguished from the suspensoid colloids are the emulsoid colloids, as exemplified by glue, gelatin, etc. These materials are characterized by their preference for existing in the colloidal state. They are mostly of very high molecular weight, and single molecules may thus be colloidal in size. These substances need not be charged nor artificially comminuted to remain in colloidal suspension. In general, when placed in contact with a suitable solvent, they absorb it and swell up; and, if enough solvent is present, they will eventually go into a colloidal dispersion. This process has been called spontaneous peptization. It is just a question of dispersing substances whose ultimate particles are already colloidal in size.

So much for the colloids in general.

An emulsion is a specific type of colloid consisting, again, essentially of two phases, both of which are liquid. This does not exclude emulsions containing waxes and oils, which are solid at ordinary temperatures, for, when they are to be emulsified, they are first melted and thus are liquid at the temperature at which emulsification takes place.

In the process of making emulsions, there are three things to consider; i. e., the comminution of the dispersed phase, the dispersion of the dispersed phase, and the stabilization of the emulsion. Since the emulsions under consideration consist of liquid systems, the comminution is a relatively simple affair, for a liquid can be broken up into very fine globules by stirring, shaking, or some other sort of agitation which may include ultrasonic vibrations, electric waves, and even light. Likewise, the dispersion in this case is not difficult. The same stirring that breaks up the dispersed phase will distribute it more or less homogeneously throughout the dispersing medium.

The question of stabilization, however, is a little more complex. It brings to consideration protective colloids and emulsifying agents. The type of emulsion will determine which type of stabilization is suitable. The protective colloids are those substances which have been mentioned above as emulsoid colloids, which are very stable in the colloidal state. The mechanism of protection depends upon the fact that the particles of the dispersed phase adsorb on their surface a shell of the material of the protective colloid and are thus themselves

rendered stable. An example of this type of protection would be a paraffin wax emulsion in water, which is stabilized with glue.

If a mixture of turpentine and water is vigorously shaken, the turpentine will break up into minute droplets dispersed throughout the water. In a very short time the droplets will coalesce and rise to the top, the two phases separating nearly completely. The emulsion can be stabilized, however, by adding an emulsifying agent, in this case glycol mono-oleate. The emulsifying agent may act in various ways. It may produce ions which, when adsorbed, will charge the particles; it may aid in reducing the particle size to colloidal dimensions by reducing the surface tension of system; or, it may do both. Examples of typical emulsifying agents are: soaps, certain types of esters, sulfonated oils, etc.

The three examples of emulsifying agents given in the preceding paragraph have at least one thing in common—they are all composed of a water soluble part and an oil soluble part. In sulfonated castor oil, for instance, the sulfonic acid group is water soluble and the rest of the molecule is oil soluble. In a typical soap, say sodium oleate, the alkali metal part is water soluble and the oleic acid radical is oil soluble. Glycol mono-oleate is an ester that is an emulsifying agent, and here the free hydroxyl group in the half-ester is water soluble, and again the oleic acid radical is oil soluble. Thus, it is perhaps apparent why these substances act as coupling agents between oils and water.

Refinements in mechanically comminuting a substance are the colloid mill and the homogenizer. The colloid mill consists essentially of a block and a tightly fitting rotor. The material being worked on is forced in between the two and the rotor produces a strong shearing force, the force being dependent upon the separation of the two parts, which is variable, and the speed of the rotor. The homogenizer is an arrangement where mixed fluids are forced through a small aperture at high pressure and immediately impinge upon a hardened plate, at high velocity of course, this procedure causing extensive breaking up and intimate mixing of the fluids, the fluid of lower surface tension forming droplets and the other surrounding them. A later variation in homogenizers is to have the plate revolving at high speed, thus giving greater scattering action. It has been found advantageous sometimes to use the colloid mill first and the homogenizer afterwards. These machines give far finer dispersions than can be obtained by ordinary agitation, and thus result in more stable emulsions.

One interesting variation in emulsions is the fact that using the same two substances, say turpentine and water, two types of emulsions are possible—water as the dispersed phase, and the turpentine as the dispersed phase. The type desired can be controlled by the use of the correct emulsifying agent. An agent that is primarily soluble in water, such as sodium oleate, will produce a turpentine-in-water emulsion; and an emulsifying agent that is primarily soluble in turpentine, such as glycol mono-oleate, will produce a water-in-turpentine emulsion. A simple way to distinguish the two types experimentally would be to try to dilute the sample with water. If the emulsion is miscible, then it is of the oil-in-water type; if it is not miscible, it is the water-in-oil type.

The factors that govern the stabilization of emulsions can be used to break them. For instance, if an electric charge tends to stabilize an emulsion by keeping the particles apart by electrical repulsion, then this particular type should be broken, adding an electrolyte that will partially or completely neutralize or diminish the charge. This is indeed found to be the case. The addition of an electrolyte will coagulate an electrically charged dispersed phase. Then again, if some means is found to remove the shell of a protective colloid from the individual dispersed particles, then this type of emulsion will also break. Alcohol, as a dehydrating agent will do this in many cases. Sometimes both alcohol and an electrolyte are necessary. A noteworthy fact concerning electrolytic coagulation is that when the emulsion is of the type where stability depends largely upon the charge the particles bear, then the valence of the electrolyte is of major importance. Thus the coagulating effects of sodium chloride, magnesium chloride, and aluminum chloride are as one, to one hundred, to one thousand respectively.

Electrolytic Method Breaking Emulsions

The electrolytic way of breaking an emulsion is the most general, but emulsions can be broken in other ways. Excessive agitation will do it, and the explanation is that the individual particles are forced together by the mechanical forces being stronger than the forces keeping them apart. Thus larger and larger particles are formed by the contacts; and, eventually, the particles become so large that they precipitate.

The effect of temperature on making and breaking emulsions is not fully understood as yet, but that there is an effect is certain. Some emulsions must be made while the solutions are hot. Other emulsions may be made in the cold. As has been stated above, waxes must be emulsified at a temperature that is equal to or higher than their melting point. Mineral oil, protected by gum acacia, can be incorporated into water to form a stable emulsion while cold. As far as the effect of temperature on breaking emulsions goes, it is well-known that boiling and freezing will coagulate and precipitate some emulsions.

The Cotrell smoke precipitator is an example of the electric breaking of emulsions. The charged colloidally-dispersed smoke particles are precipitated by contact with an electrode being drawn to it by an electric field. This, of course, is concerned with solid-gas systems and not liquid-liquid, but the principle can be applied to the latter.

Very rapid vibrations have been known to throw out emulsions at ultra-sonic vibrations, various radiant energies, etc. While their use in causing dispersions is still a laboratory procedure, the fact that they will precipitate emulsions must be kept in mind, so that the latter should, as a safeguard, be kept from light, strong sources of short radio waves, etc.

Undeniably, there is yet a great deal to be learned concerning colloids in general and emulsions in particular. But vagueness and uncertainty are being slowly eliminated as more and more industries learn the importance of colloids in diverse fields.

Cleaner for Galvanized Metals

A. Parsons, Tillsonburg, Ont., Canada, reports a practical, simple method of cleaning metals that have galvanized before painting, as follows: "Mix two tablespoonfuls of oxalic acid to a pint of white vinegar and allow the mixture to stand. The longer it stands the better it will act as an oxidizing agent on the metal. It is used to best advantage after being set aside for two months. Apply the liquid to the metal surface to be painted with a brush or cloth and allow time for drying. No brushing down is needed.

"I have been painting signs on metal for a good many years," says Mr. Parsons in the *Canadian Paint & Varnish Magazine*, "and the above formula is the only one which I have tried in the last four-and-a-half years which guaranteed me a non-peeling sign when paints with a lead base are used. I hope this method will be of use to readers of *Canadian Paint and Varnish Magazine*, as it has been a business-getter for me."

Soldering Compounds

By Charles F. Mason, Ph.D.

THE average person is familiar with the simplest type of soldering fluid for many have seen the plumber immerse metallic zinc in commercial muriatic acid and wait for the reaction to come to completion before applying the resulting solution to the metallic parts to be joined by soldering. To avoid the inconvenience of preserving such solutions in glass containers plastic mixtures were introduced in tin plated cans and displaced the solutions to a large extent. Solutions are now being sold in tin cans and are desirable when rapid spreading is necessary, but they have been improved and are more complex than zinc chloride in acid and water.

As new metals and alloys were introduced with more modern methods of welding, simple mixtures were neither solvents nor fluxes for all metallic oxides encountered. As a result in the past thirty years one hundred and thirteen patents have been granted here and abroad upon compounds comprising liquids, semi-solids and solids with specifications about the type of metals to which they are applicable. Contributions to the science in this field have lagged far behind the art, and only three articles have been published. The activity in the patent situation for the past seven years has been the attainment of exclusive rights upon the use of synthetic organic compounds in soldering rather than the improvement of the mixtures themselves and the prices of these are prohibitive for sale at competitive prices.

Although more than one hundred formulae are available those listed below can be compounded at prices to meet present day competition and are classified under the headings of solutions, pastes and solids with the metals for which they are specified.

Solutions:

1.	Zinc Chloride anhydrous	10
	Glycerol	5
	Alcohol (Denatured)	10
	Water	75
2.	Zinc Chloride anhydrous	26
	Ammonium Chloride	3
	Hydrochloric acid (Sp. G. 1.18)	6
	Cellosolve	5
	Water	60
3.	Antimony Oxide	5
	Glycerol	5
	Zinc Chloride anhydrous	20
	Hydrochloric acid (Sp. G. 1.18)	5
	Water	65
4.	Glycerol	25
	Alcohol (Denatured)	50
	Zinc Sulfate	25
5.	Cuprous Chloride	10
	Copper Strips	3
	Methyl Alcohol	87
6.	Rosin	53
	Benzine	47
7.	Zinc Chloride anhydrous	20
	Sulphonated Mineral Oil	80
8.	Zinc Chloride anhydrous	14
	Amyl or Butyl Acetate	86

Pastes:

1.	Zinc Chloride	20
	Palm Oil	80

The Zinc chloride is mixed with sufficient water to form a heavy paste and is then triturated into the palm oil.

2.	Petrolatum	60
	Rosin	20
	Silicate or filler (fusible)	20
3.	Hydrochloric acid (Sp. G. 1.18)	10
	Phosphoric acid (syrupy)	8
	Lactic acid	8
	Lanolin	74
4.	Ceresin	10
	Stearic acid	30
	Rosin	22
	Zinc Chloride anhydrous	38

The first three components are melted in a steam heated kettle and when liquid the zinc chloride is stirred in. It will result in a granular structure.

5.	Ammonium Chloride	29
	Sulfur (powder)	33
	Rosin	2
	Paraffin	9
	Tallow	21
	Salt (table)	5
	Balsam (any desired odor)	1

The paraffin and tallow are melted in a steam heated kettle and while molten the other solids are stirred in; the balsam is added after the mixture has been removed from the heat.

6.	Hydrofluoric acid (commercial)	2
	Phosphoric acid (syrupy)	1
	Borax	6
	Gum Arabic or Karaya	15
	Water	76

The water is first heated to boiling and the source of heat is removed; the gum is added in small quantities and stirred in before adding more. When a homogeneous jelly is obtained the other components are added and stirred in thoroughly.

7.	Stearic acid	35
	Borax	4
	Rosin	4
	Balsam (any desired odor)	10
	Tin (powdered)	32
	Zinc (powdered)	15

Solids:

1.	Iron powder	65
	Borax	20
	Sodium Carbonate	15
2.	For cast iron. Zinc Chloride anhydrous	65
	Ammonium Chloride	10
	Potassium Chloride	14
	Sodium Chloride	11
3.	For aluminum. Potassium Chloride	45
	Sodium Chloride	30
	Potassium Fluoride	7
	Lithium Chloride	15
	Sodium Pyro Phosphate	3
4.	For iron, copper and brass. Calcium Hydroxide	1.5
	Aluminum Oxide	1.5
	Aluminum powder	1
	Borax	60
	Potassium Chlorate	36
5.	For aluminum. Barium Chloride	40
	Potassium Chloride	30
	Sodium Chloride	20
	Cryolite	10
6.	Borax	52
	Sodium Phosphate (tri)	13
	Solder (powdered)	35
7.	Zinc Chloride anhydrous	8
	Ammonium Chloride	80
	Sodium Fluoride	12
8.	Ammonium Chloride	5
	Rosin	15
	Zinc Chloride anhydrous	20
	Urea	10
	Solder (powdered)	50

This combination is usually sold in pellet form.

9. Tri Chlor Naphthalene (melted upon the warm metal and then wiped off).

Consideration of formula number one under solutions will show that after evaporation of the water and alcohol, the residue remaining behind upon the warm metal is zinc chloride dispersed in glycerol and any oxides which may have been dissolved by the hydrochloric acid. The acid resulted from hydrolysis of the zinc chloride in water and was lost by evap-

oration and recombination. This resulting film can be wiped off leaving a clean metal surface but usually it is not and when the molten metal is applied over it the resulting joint is firm even though one might surmise that an intermittent layer of foreign material would be a weakening factor.

This may be true in many cases. The failure of soldered, welded, and brazed joints may, it is true, be attributable to the soldering compound used, but until more fundamental investigations have been made, the choice of the most suitable compound must remain largely a matter of opinion. However, the writer has seen copper plates of four to five square feet in area treated while hot with this soldering fluid and after four to five minutes molten solder poured over it to a thickness of six times the thickness of the copper plate and the joint was sound. These copper plates reinforced with solder were subjected to severe mechanical strain and for years no failures have been reported.

In the case of formula six under solutions the residue remaining after evaporation of the inflammable benzine is rosin which forms resinates with the oxides and being soft unctuous compounds can be wiped off. This same line of reasoning can be applied to all the formulae listed above, but the open question still remains. The best for this metal or that alloy must be answered by experiment.

Sugar in Concrete

Not long ago it was reported that sugar, saccharose, can be used in the preparation of concretes to increase the solidity of the mortar. The patent of I. Cséti (Hungarian 115,403) solves the same problem by mixing various adhesives—casein, fish glue, etc.—with water or aqueous solutions to quicken the binding time, water glass, and finally adding binding matter—cement, bauxite, gypsum, etc.—to the mass. The method is said to bind rapidly and to have a high solidity.

Furfural for Road Paving

Highways built from waste farm products are the goal of Dr. Hans Winterkorn, assistant professor of soils, University of Missouri, who has discovered that furfural has great potential value as a cement in the construction of semi-flexible roads, according to Public Safety.

Quick Setting Adhesives

One of the newer materials offering promise of valuable application in the production of quick-setting adhesives is ethyl cellulose. This field of application is dependent upon the toughness of ethyl cellulose, its compatibility with resin-plasticizer mixtures and ready solubility in a wide variety of organic solvents. By proper selection of resin and plasticizer it is possible to make adhesives of the hot melt type or adhesives with a solvent base, depending upon the type of application.

The hot melt type, according to American research, can be formulated with as little as eight per cent. ethyl cellulose with the balance resins and plasticizers. Among the resins found suitable for this use are dewaxed damar, kauri, phenol resins (certain types) and ester gum. Selection of the proper type of plasticizer is primarily dependent upon compatibility of that plasticizer with ethyl cellulose, although, for many uses, such plasticizer qualities as color, stability to light and heat and freedom from odor and taste are of the utmost importance. Four plasticizers which meet all these requirements are stated to be diamyl, diethyl, dibutyl and dimethyl phthalates.

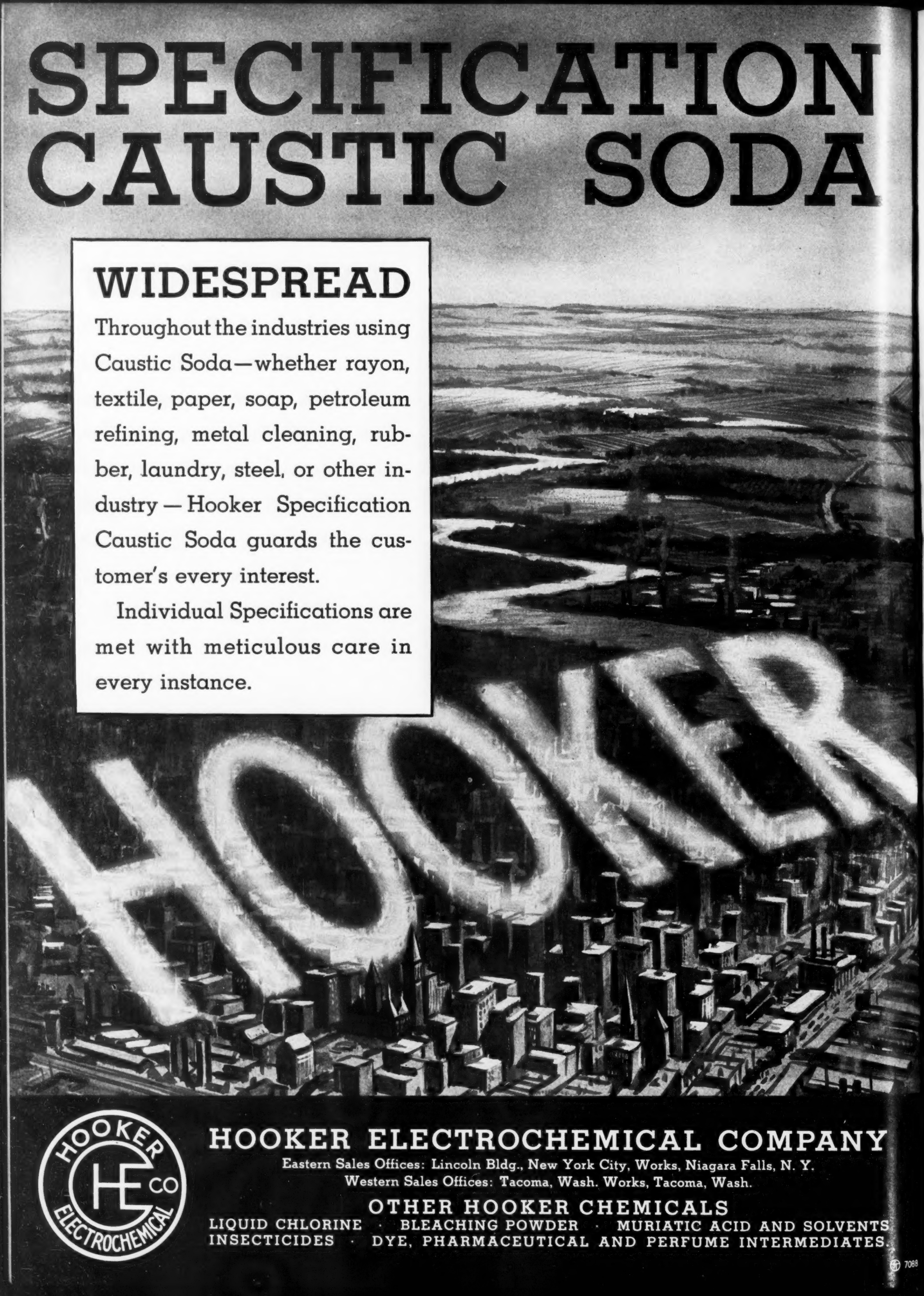
One striking characteristic of hot-melt adhesives is the unusual rise in melting point resulting from the addition of ethyl cellulose. It has also been found that ethyl cellulose is effective in diminishing the tendency of waxes and resins to crystallize. These adhesives have been used for the lamination of: (1) Cellophane to paper; (2) cellulose acetate to cellulose acetate; (3) Cellophane to Cellophane; (4) metal foil to Cellophane; (5) metal foil to paper; (6) cardboard to cardboard; (7) cloth to cloth; (8) paper to paper.

It is reported that formulations of this type may be made to show excellent adhesion at 0° C. and assure bonding for at least one hour, when the lamination is subjected to a dead weight of 20 grammes per square inch at a temperature of 5° C.

Since ethyl cellulose is soluble in a wide variety of organic solvents, selection of the proper type may usually be made from the standard lacquer solvents as well as the aromatic coal-tar solvents. Ethyl alcohol dissolves as much as 16 per cent. by volume of ethyl cellulose. This solution may be made perfectly clear with the addition of toluol. Butyl alcohol, mixed with xylol, also gives a clear solution. Other acceptable solvents are amyl alcohol, amyl acetate, butyl acetate, ethyl acetate, ethyl lactate, and acetone. All of these are reported to give good solution with from five per cent. to 16 per cent. of ethyl cellulose. *Chemical Trade Journal*, May 21, '37, p. 451.

Physical Characteristics of Chief Metallic Soaps

	Oleate	Stearate	Palmitate
Lead	Viscous, gummy mass m.p. 50° C.	Voluminous powder, greasy to the touch m.p. 115° C.	White, granular powder m.p. 106° C.
Zinc	Amorphous mass, cream color Cannot be ground m.p. 65° C.	Fluffy, white powder m.p. 125° C.	Voluminous white powder m.p. 130° C.
Copper	Hard, waxy, blue mass No definite melting point Decomposes on warming	Pale blue, light powder m.p. 125° C.	Voluminous, crumbly mass Slightly soluble in water m.p. 110° C.
Silver	Greyish or yellowy powder Oily to the touch Odor of oleic acid	Fine, odorless powder Readily ground	White, talc-like powder
Mercury	Viscous semi-solid mass Gradually hydrolyzes in air No m.p.	Fine, white powder, melting to a white, opaque solid m.p. 112° C.	Fine, white powder m.p. 105° C.
Nickel	Greenish-blue oil Readily oxidized in the air Somewhat soluble in water m.p. 20° C.	Light green, voluminous powder Decomposes partly on melting m.p. 100° C.	White, crystalline opaque mass m.p. 45° C.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New and Unusual Uses of

WETTING AGENTS

Discussed by P. E. Hattinger

WETTING is a preliminary condition to chemical reaction, particularly when the reaction is to take place between two different phases. Thus in reactions between two non-miscible phases, such as an aqueous solution and an organic liquid, the presence of a wetting agent enables interaction to take place more readily by lowering the interfacial tension between the liquid layers. Colonge (*Bull. Soc. Chim.* 1936, 501) has reported the successful application of a wetting agent in the reaction between phenyl nitrite and caustic soda solution of arsenic acid as reducing agent to give a 75 per cent. yield of azoxy compound. Another instance of the helpfulness of wetting agents in promoting reactions between immiscible phases is a recent German proposal to use wetting agents in the nitration of cellulose.

"Wetting agent" is a very elastic term and includes perhaps hundreds of different compounds. New substances claimed to have wetting and capillary action are being discovered and patented almost every day yet common soap is a wetting agent of considerable value. The property of reducing the surface tension of water is shared by numerous compounds whose other chemical properties are widely different. Thus, the sulfonated castor oil products possess the power to reduce surface tension, also the sulfated fatty alcohols and the substituted sulfonated naphthalene compounds, to choose classes of compounds already well known. Of those just mentioned, the sulfated fatty alcohols possess detergent power in addition to wetting ability. It does not always follow that the two run together. Compounds such as iso-propyl-naphthalene sulfonic acid possess wetting power but no detergent action. Those bodies which wash well are in general of a fatty character like soap, while the pure wetting agents are solids which dissolve to give clear aqueous solutions without washing power. For some purposes detergent power is not necessary. Spray compositions for fire extinction do not call for wetting agents with washing properties, yet such agents might be used if desired.

Perhaps the most important criterion of wetting agent from the angle of wide industrial application is its stability to hydrogen and calcium ions. As is well known, soap breaks down with either acid or lime, loses its wetting power, and forms an insoluble fatty acid or lime-soap curd. Clearly, soap would be unsuitable for use in an acid foam fire extinguisher mixture containing alum or bisulfates.

On the other hand, a sulfated fatty alcohol product would be quite satisfactory for such work since it is not attacked by mild acid contacts. A common member of this class is lauryl sulfuric ester which is sold in commerce as the sodium salt admixed with unchanged fatty alcohol and sodium sulfate: $CH_3 . CH_2 . CH_2 . CH_2 . CH_2 . CH_2 . CH_2 . CH_2 . CH_2 . CH_2 . CH_2 . CH_2 . O . SO_3H$ . . . . Na. Another well established class of wetting agents are the Igepons, stable to both acids and salts in most proportions used in practice. These are based on fatty acids condensed with bodies like isethionic acid or taurine.

Any new wetting agent may readily be tested for stability towards lime and acid simply by making a 1% aqueous solution and boiling portions for an hour with varying proportions of sulfuric acid. Soap cracks out immediately but some compounds, notably the Igepons, appear to be unchanged by such drastic treatment. Sulfated fatty alcohols usually break down after boiling longer than 30 minutes.

The Deutsche Hydrierwerke find the addition of wetting agents to adhesives of all kinds desirable since they improve swelling power and spreading power and prevent mold. To a starch paste adhesive they propose to add 1 to 3 per cent. of sodium cetyl sulfonate, to glue mixtures 0.5 per cent. of lauryl alcohol and to gum arabic 2 per cent. of oleyl sulfonate.

The use of wetting agents in adhesive composition in a dry powdered form is proposed by Henkel & Cie, of Germany. From 0.1 to 1% of the wetting substance is added to the dry adhesive, or solutions of both may be mixed and subsequently dried. In an example, 100 kgm. of cold water-soluble starch are mixed with 2 kgm. of the sulfuric esters of a mixture of octyl, decyl, dodecyl (lauryl), tetradecyl and cetyl alcohols. Numerous other wetting agents may be used if desired, for example, the sodium salt of thiosulfuric acid esters of mixtures of fatty alcohols may be employed in conjunction with cold water-soluble starch (E. P. 432,486). A formula for an adhesive composition containing the sulfuric ester of dodecyl or lauryl alcohol is given in Canadian Patent 355,887. Three parts of the sodium salt of the sulfuric ester referred to are dissolved in 17 parts of water and added to 166.6 parts of 60 per cent. rubber latex. To this is added 10 parts of phenol in 90 parts of water, and 100 parts of 15 per cent. sulfuric acid are now added and stirred in and the mixture placed on trays, dried at 60 to 70 deg. C. and baked later for 2 hours. The residue is milled, washed with water, again milled and homogenized.

A great deal of research on wetting agents has been carried out in the horticultural schools, which is available in the scientific literature, dealing with the investigation of spray solutions for killing insects on the leaf. The addition of wetting agents aids the spreading of such a mixture and promotes destruction. One new product combines the wetting and poisonous elements in one compound. Thus, Bousquet, Salzberg and Dietz have found that lauryl rhodanate is a highly effective contact insecticide, far superior to soap against aphids. This body consists of the same lauryl alcohol mentioned previously, namely $CH_3 (CH_2)_{10}.CH_2.OH$ converted to the isocyanate ester instead of the sulfuric ester, thus

$CH_3.(CH_2)_{10}.CH_2.O.SO_3H$	$CH_3(CH_2)_{10}.CH_2.SCN$
Lauryl sulfuric ester	Lauryl rhodanate

Whereas the rhodanate on trial against chrysanthemum aphids gave a 100 per cent. kill, potassium oleate gave only a 12 per cent. kill under the same conditions. (*Ind. & Eng. Chem.*, 1935, page 1342.)

The addition of wetting agents to almost any insecticidal, fungicidal horticultural spray or dusting powder appears to improve its action. Common poisonous principles used in this class of work include nicotine dust, Bordeaux powder, petroleum emulsions, and colloidal lead arsenate, so it is obviously desirable that the wetting compound should be as stable as possible in order to prevent any possible interaction with these. A patent to Leech, Fitzgibbon and Lunevale Products (E. P. 429,615) proposes to add to horticultural mixtures sulfonated lauryl alcohol and di-isopropyl naphthalenesulfonic acid.

Another related field of application is in connection with the washing of fruit sprayed with wax or insecticide in order to protect it against attack. There is a real health danger in the possibility of fruit such as apples being insufficiently washed after coating with arsenic or lead, so the problem is an urgent one. The usual wash in hydrochloric acid or sodium silicate solution has been found more satisfactory if a suitable wetting agent is also included. Since the wash liquor is strongly acid or alkaline, only chemically stable agents are suitable, soap for example being useless in conjunction with acid. Recent work by Robinson (*Ind. & Eng. Chem.*, 1936, page 455) shows that apples may be advantageously washed after spraying with a solution of hydrochloric acid containing 2 to 6 pounds of sulfated fatty alcohol or like wetting compound. In an actual experiment

where unwashed apples were tainted with 0.108 grains of lead per pound, a 1.5 per cent. solution of acid reduced this amount to 0.038 grains per pound, but with an addition of wetting agent, the washing was so improved as to remove all but 0.004 grains per pound of the lead residue.

Wetting Agents in Fire Extinguishers

The success of any fire-extinguishing mixture applied to combustible material already burning or in danger of burning obviously depends upon that material being quickly wetted by the water or fluid applied. No matter how great a quantity of water is caused to impinge against a curtain for example, very little extinction will occur unless the fabric rapidly wets with the water. Many cotton fabrics are notoriously difficult to wet on account of the large surface they possess and the consequently inert film of adsorbed air which they retain. When water is flung against such a fabric it tends to form globules on the surface and ultimately run off again effecting very little change in the combustibility. If, however, an aqueous solution containing a wetting agent is applied with high power of wetting, spreading and penetration, the fabric relinquishes the film of air and absorbs the water.

This essential idea is contained in a proposal of the I. G. Farbenindustrie some years ago to apply dilute solutions of wetting agents for fire extinguishing purposes. (E. P. 319,083.) For example, 1 to 2 parts of the sodium salt of propyl-naphthalene sulfonic acid is added to 1000 parts of water. The I. G. market a product called "Nekal" which is probably a suitable agent. Another German concern, Komet Kompagnie fur Optik, Mechanik und Electro-Technik, have a patent for the use of sulfonates of fatty alcohols or salts of aromatic alkylated sulfo-acids as foaming agents in producing fire-extinguishing foam. A recent French patent (788,401) gives details of a proposed method of making a fire-extinguishing mixture in which bicarbonate of soda is one ingredient, aluminum sulfate is the acid material, and in addition a wetting agent such as sodium lauryl sulfate or Igepon is present in solution in the acid ingredient. Clearly only acid-stable wetting agents may be employed here.

Dust explosions are a common hazard in mines and in this sphere wetting agents may prove of great value in preventing disasters. According to Tideswell and Wheeler's report in "The Transactions of the Institute of Mining Engineering," 1934, a 1% aqueous solution of a wetting agent is better than water alone for spraying coal to prevent inflammation. A recent patent to W. Warr gives details for making up a suitable dust-spraying solution: 10 pounds common salt or ammonium chloride are dissolved in 10 gallons of water and mixed with 1 pound of wetting agent, "Perminal W," dissolved in 1 gallon of water. The above is sufficient to treat 60 to 100 pounds of coal dust. (E. P. 451,934.)

Related to laying dust in mines is laying dust on roadways. Spraying with a dilute aqueous solution of wetting agent every 2 to 3 weeks is recommended by Hay & Wheeler (*Jl. Inst. Mining Eng.*, 1936, page 213). The present day practice of using a solution of calcium chloride for road spraying is capable of being combined with the use of wetting agents since many of them such as alkyl naphthalene sulfonic acids, sulfated fatty alcohols, and similar products are not affected by calcium ions.

Wetting agents have been used for many years in the flotation process for separating ores. Pine oil is a common agent employed. It is of interest that sulfated fatty alcohols have been tried against pine oil in the treatment of lead-zinc ores, barytes and coal. The stability of such compounds towards metallic ions makes them useful in certain special cases where the cost is justified.

The technical literature contains many curious instances of the use of wetting agents in a variety of different fields. A brief review of some will show how universally adaptable such agents may be in practical processes.

The Hanson-Van Winkle-Munning Co. consider the addition of certain surface-tension reducing agents to galvanizing fluxes desirable. The presence of a glucoside or water-soluble carbohydrate in the fluxing salts, sal-ammoniac etc., causes a persistent froth layer on the bath of molten zinc. Many vegetable compounds are proposed as suitable, including licorice root, saponin, soapbark, tannin and numerous sugars.

Phenomenon of Foaming

The phenomenon of foaming is very closely related to that of wetting; substances of low surface tension which possess high wetting power frequently behave as foaming agents under certain conditions. The I. G. in the recent British Patent 460,596 give details of the composition of a foaming agent for use in the production of air foam. A highly concentrated solution of a wetting agent such as a sulfonated fatty alcohol, an alkylated naphthalene sulfonic acid, for instance, is mixed with an albumen product obtained by hydrolysis of albuminous matter with alkali. Two solvents are present, water and another solvent miscible with water such as alcohol or a glycol. There is another recent patent belonging to the same company in which the ingredients are essentially the same, except that an amine of a long-chain fatty alcohol radicle constitutes the wetting agent.

Wetting Agents in Pencil Leads

A German company has taken out patents relating to the use of wetting agents in pencil leads. Many wetting agents also find their way into hair shampoos. A number of proprietary preparations now on the market comprise sulfated fatty alcohols as the principal detergent. No matter how hard the water or how greasy the scalp, washing with such materials is very successful and leaves no film on the hair. One well-known firm of manufacturers of vacuum cleaners have instituted a carpet cleaning process involving the application of sulfated fatty alcohol compounds. Soaps made from these are highly satisfactory for carpets and do not affect the colors. A novel application of certain wetting agents is in the preparation of cleaning cloths to remove mistiness or bloom from polished surfaces. (E. P. 460,543 to Halden & Co., Ltd.) The use of wetting agents in connection with the treatment of green fodder to aid preservation is not without interest. (E. P. 422,350.)

Soap Stops Oil Well Drowning

How ordinary soap may prevent the "drowning" of oil wells and give greater yields of water-free crude oil is revealed in a patent granted to George E. Cannon of Houston, Texas, and assigned to Standard Oil Development Company. He claims that by pumping a plain soap solution down into the bore holes of oil wells the pores can be plugged up in the underground sands through which oozes the water that is responsible for "drowning" the well and contaminating the oil. The plugging action occurs when the soap reacts with the magnesium and calcium salts in the water. A reaction takes place to form a tough soap curd which fills up the pores right in the sand and keeps the water from getting through. The salts in the hard water react with the soap to form a soap curd which shows its presence as a ring around the bath tub.

Heretofore, cement has been pumped down into the bottom of the well to plaster the walls of the bore hole in order to keep water out, but this not only blocks the flow of water but also the ooze of oil from the oil-bearing sands into the well. This means less oil is obtained from the well.

Big advantage of using soap instead of cement, claims Cannon, is that the soap only blocks the flow of water from the water sands. Thus, the pores in the oil sands are left open to ooze their oil into the well, since the soap is inert to oil and is not curded by it.

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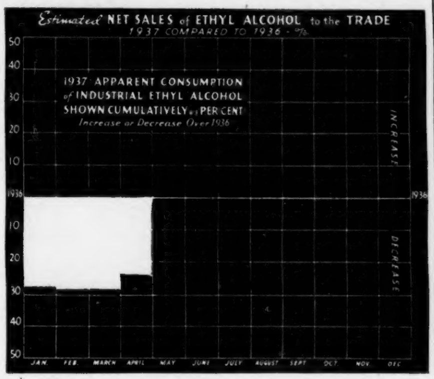
SOLVENT NEWS

Reg. U. S. Pat. Off.

JULY ★ A Monthly Series of Articles for Chemists and Executives of the Solvent-Consuming Industries ★ 1937



Apparent consumption of industrial ethyl alcohol from Jan. 1 to April 30, 1937, was 17,354,000 wine gallons. This is 23.9 per cent less than during the same period in 1936 when 22,791,000 wine gallons were consumed.

AN INCREASE of 1¢ per gallon featured new price schedules for pure and denatured alcohol released on June 15. The new prices became effective immediately and apply to spot or contract business during the third quarter. Retail schedules covering Tax Free and Tax Paid alcohol remained unchanged.

TRI-ESTER LACQUERS CHEAPER WITH SOLOX

With no signs of waning interest, various lacquer manufacturers are pushing forward development work on finishes formulated with cellulose acetobutyrate. Clear lacquers over steel, iron, copper, brass, aluminum and other metals are very definite foci of interest. Cloth impregnation is looked upon as another fertile field, since cellulose acetobutyrate is regarded as one of the cellulose derivatives having high stability to light and heat.

Rapidly coming to the fore as one of the most useful solvent mixtures is that formulated with ethylene dichloride and *Solox*, proprietary solvent manufactured by the U. S. Industrial Alcohol Co. Since ethyl acetate, a solvent for cellulose acetobutyrate, is an essential component of *Solox*, the mixture has the virtues of cheapness and compatibility. It has been found particularly useful in machine application.

U.S.I. phthalate ester plasticizers, diamyl-, dibutyl-, diethyl-, and dimethyl phthalates are compatible plasticizers where stability to light and heat and freedom from taste and odor are prime requisites.

JAPAN LEADS IN NEW CHEMICAL PRODUCTS

Japan probably surpassed all other countries in the number of new chemical products introduced during 1936, according to a world survey of the chemical industry prepared by the Commerce Department's Chemical Division. Chemical research continued on an extensive scale throughout the world, the survey reveals, with many new products introduced to world markets.

The survey, "World Chemical Developments in 1936," known as Trade Promotion Series No. 169, can be obtained from the Supt. of Public Documents, Government Printing Office, Washington, D. C., at 30 cents a copy.

A TABLE listing mechanical and other properties of twelve principal plastic materials may be obtained by writing to U.S.I.

CURBAY ENTERS COAL TREATMENT FIELD; WINS ACCEPTANCE IN ROAD STABILIZING

Used On Secondary Roads To Cut Maintenance Cost

REDUCES GRAVEL LOSSES

A new term—"Curbay stabilized"—is gaining the recognition of New Jersey highway engineers. Heartened by the steady progress made with the application of Curbay to secondary roads, particularly gravel, and to road shoulders, they foresee in it a means of providing wearing courses which are cheap, easily maintained and can be used later as a base for bituminous, concrete or other types of highway surfacing.

While conditions naturally vary from locality to locality, enough work has been done to demonstrate that Curbay may be suitably applied without recourse to specialized equipment. This is regarded as highly significant in view of the difficulties ordinarily encountered in securing adequate penetration with economy.

No Large Expenditures

A major problem in this work has been to maintain roads in a satisfactory condition without large expenditures. For example, it is not economically feasible to pave roads with relatively light traffic. Since the bonding action of Curbay reduces gravel losses, it is used to protect new gravel roads during the seasoning year prior to the addition of bituminous or other paving. Unforeseen drainage problems which develop may be readily corrected without loss of investment, engineers say.

In terms of safety, the Curbay treatment is still more encouraging. It makes possible the maintenance of a smoother all-weather surface and eliminates the need for excessive crowns so essential on untreated roads. Thousands of miles of secondary roads remain to be treated. With the advent of Curbay, a new line of attack on old problems has been opened.

U.S.I. Product In Emulsions For Dust Proofing Coals

NO CORROSION OBSERVED

Discovery of certain emulsions which make possible a new type of efficient dust treatment for coal was announced recently. Although in the experimental stage, several types are reported to have a marked beneficial influence on the burning characteristics of the coal and eliminate corrosion of tipples, freight cars, storage bins, etc., sometimes experienced with other dust laying compounds.

The announcement comes at a time when combustion engineers are seeking suitable materials for dust proofing substandard coals similar to those mined in Illinois, Indiana, Kentucky, Iowa, Kansas and certain districts of Pennsylvania and West Virginia. Coals of this type offer an enormous market for the new treatment, the inventor asserts.

The new emulsions are described as compounds of Curbay, emulsifiable oils, water and small quantities of certain catalysts, fundamentally different in their effect and much more potent than any previously applied. The coal is sprayed with a definite quantity of the

(Continued on next page)

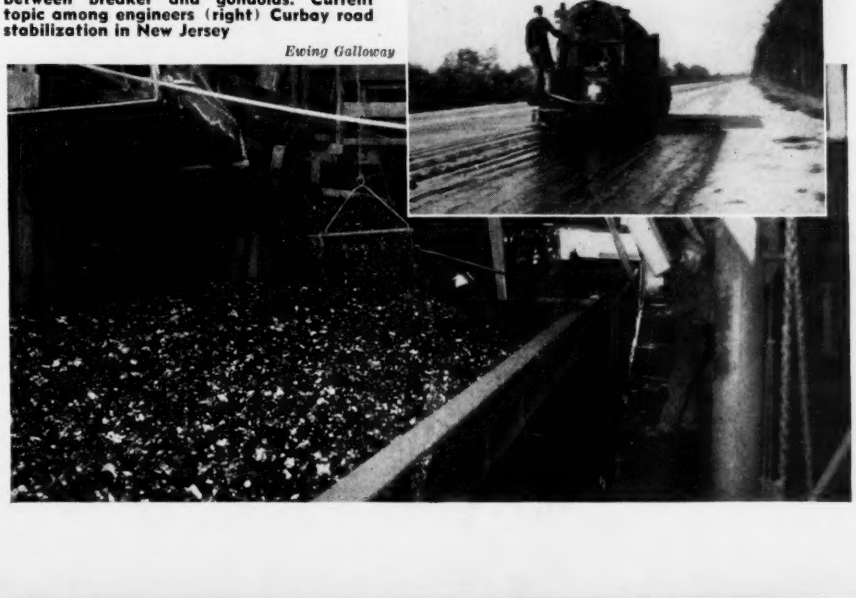
C. S. MUNSON ELECTED TO M.C.A. EXECUTIVE BOARD

Charles S. Munson, president of the U. S. Industrial Alcohol Co., was elected to the executive committee of the Manufacturing Chemists' Ass'n of the United States at the annual meeting on June 3 at the Seaview Golf Club, Absecon, N. J. The election of Mr. Munson and R. H. Dunham, president of Hercules Powder Co., increased the membership of that board from thirteen to fifteen, and permits the committee to handle the heavier volume of business that has developed in the past year.

U.S.I.'s CURBAY in Dust Treatment for Coal and Road Stabilization

LOGICAL point for applying Curbay dust proofing emulsions is the coal chute (below) between breaker and gondolas. Current topic among engineers (right) Curbay road stabilization in New Jersey

Ewing Galloway



JULY ★ **SOLVENT NEWS** ★ 1937

UNUSUAL OIL SEAL COMPOUND SOUGHT FOR TRANSFORMERS

Seeking an oil-sealing compound with unusual properties, a manufacturer of electrical equipment recently asked the editors of *Solvent News* for their recommendations. Not knowing of any material which would meet the particular demands, it was decided to pass the question on to *Solvent News* readers.

The problem is to seal cemented joints exposed to oil in transformers and circuit breakers. The mechanical load is carried by a cement such as litharge and glycerine, but a sealing compound not affected by oil at 150 deg. F. or —30 deg. F. for extended periods is needed. Since the joints require a considerable volume of plastic cement, thermal expansion is an important factor in securing adhesion to glazed porcelain surfaces over the wide temperature range.

The compound should have the following characteristics:

1. No reaction with transformer oil in six months at 150 deg. F. (No accelerated sludging of the oil or solution of the sealing compound.)
2. Oil-tight adhesion to glazed porcelain or smooth metal surfaces over a temperature range of —30 to 150 deg. F.
3. Melting temperature for application not over 500 deg. F.

Suggestions from readers will be passed on to the inquirer as part of the service which U.S.I. is glad to perform for the industry.

SOLOX AIDS DETECTION OF REFRIGERANT LEAKS

A unique use for Solox, U.S.I.'s proprietary solvent, occurs in the maintenance of refrigeration systems which use Freon or Methyl Chloride as refrigerants. It has been found that Solox is an ideal fuel for the halide leak detectors commonly used to find leaks in these systems.

Flame from the detector, which is similar to a blow torch, is played about the fittings, or wherever a leak is suspected. Where the refrigerant is escaping, the flame changes from colorless to a dark green.

Solox is the preferred "alcohol type" fuel for this purpose because it gives a colorless flame, burns without objectionable odor and is clean and inexpensive. Other uses and properties of Solox are described in a leaflet, "Solox, The General Solvent," available from U.S.I.

George VI's Coronation Robe Saved By Lacquer

Lacquer was used to protect the cloth of the gold robe worn by H.M. King George VI at the recent coronation, according to reports from abroad. This robe is the same as that originally worn by George IV in 1821, the same report continues. It was selected in preference to that worn by Edward VII, which is said to be badly tarnished.

The George IV robe is asserted to retain its original brightness although it was made over 100 years ago. This brightness is attributed to the lacquer which covers the gold thread imported from Japan. It is characteristic of the work done by Japanese artisans before the advent of modern-day lacquers.

CURBAY EMULSIONS FOR DUST PROOFING COALS

(Continued from previous page)

proper emulsion at the time of loading operations—either at the colliery or at large commercial retail yards.

Research which led to the discovery of the process began several years ago when it was found that Curbay (a complex mixture of natural gums, minerals and unfermentable sugars produced by the U. S. Industrial Chemical Co. in conjunction with the manufacture of alcohol from molasses) had the property of forming stable emulsions with certain oils. Emulsions of this nature, it later developed, had a unique dust laying action as well as significant fluxing characteristics for the ash due to the presence of mineral elements in Curbay. It remained for the inventor to find the proper catalytic agents which could vary this action to make the emulsion adaptable to all coals.

Dust proofing has been widely practiced in many areas within recent years. A variety of materials have been employed for this purpose. However, many treatments have given discouraging results because of bad slagging and clinkering during combustion. Some types of coals have developed fly ash while others have been characterized by the formation of sintered and caked masses in fire boxes. The correction of these troubles is another potential field of application forecast for Curbay emulsions.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Cellulosic plastic coatings applied to wood, metal, rubber or glass by brushing, spraying or dipping are said to have the property of shrinking tenaciously about the under surface. Coatings ranging from 0.002 inch to above 0.030 inch and which have outstanding mechanical strength and resistance to various solvents and chemicals may be obtained, according to the manufacturer.

U S I

Synthetic rubber solvent cements are claimed to be the latest addition to bonding compounds. They are said to be non-toxic in effect and particularly adapted to those applications where greater resistance to certain chemicals is required.

U S I

A new stucco and cement paint with a synthetic resin base is said to have superior durability and elasticity. Other claims advanced by the manufacturer include: easy application on any firm surface without "wetting down," no deterioration in storage, and lower application costs.

U S I

Moisture-proof paper, recently developed, may be immersed in water for as long as 96 hours without showing penetration, according to the manufacturer. It is said to have excellent folding and printing characteristics.

U S I

Self-heating plastic material requiring no elaborate dies or high pressures to mold has been reported. The material is said to have good dielectric properties and may be drilled, sawed, turned or molded.

U S I

A new modified silicate adhesive of particular interest to the corrugated paper board industry is said to have properties so adjusted as to regulate accurately the degree of penetration into the paper surface. Other features reported by the manufacturer are rapid setting without extreme heat and a resulting board of unprecedented stiffness without warping or distortion.

U S I

Insulating material made of a new cellular synthetic rubber in which nitrogen gas has been imprisoned is expected to have many uses because of its special properties. It is supplied in sheets or tubes of various sizes.

U S I

Four grades of diatomite now available for paints, enamels, etc., are reported to be 98.5 per cent diatomic silica with an exceedingly low bulking value. They are said to promote extreme hardness, flexibility and fast drying.

U S I

Sprayed metal is now being applied to wall finishes. One company reports that it has sprayed molten lead to the thickness of 0.03 in. onto the walls of a bathroom. The lead is said to provide soundproofing, moisture-proofing and decorating.

U S I

Scale formed in water heating systems may be removed with a new compound at no risk of damaging metals other than zinc, according to the manufacturer of the material. It is said to have been tested in many industrial fields.

New Disinfectant Standards Adopted

Hypochlorites, Pine Oil, Emulsified Coal-Tar and Cresylic Covered in Detail by National Association—

Full definition of the chemical and physical characteristics of the four leading type disinfectants were adopted at their annual meeting last month by the National Association of Insecticide and Disinfectant Manufacturers. These specifications have been carefully drawn up by a special committee, approved by the membership and in so far as the Association goes are official:

Liquid Hypochlorites

Classification. Liquid hypochlorites are divided into three classes: *one,* sodium hypochlorite alkaline with sodium hydrate, sodium carbonate or the other alkaline salts; *two,* hypochlorites which are essentially sodium hypochlorite and alkaline with calcium hydrate; and *three,* calcium hypochlorite solutions alkaline with calcium hydrate. A delivery of any one of these classifications shall be satisfactory unless otherwise specified.

Physical Requirements. The hypochlorite solution shall be a homogeneous liquid. It shall be miscible with water of zero hardness at 20° C. (68° F.) in all proportions. It shall be ready for dilution when delivered.

Chemical Requirements. The available chlorine content which shall not be less than 2.5 per cent. by weight shall be clearly stated on the label. Its rate of deterioration shall not be more than 10 per cent. of its original available chlorine content when stored in the original container for six months in a cool, dark place, at maximum temperature of 68° F. (20° C.).

Identification. Each container shall be marked with the name of the material, the brand (if any) of the material, the name of the manufacturer, net contents therein, and date of manufacture.

Packing. The hypochlorite shall be delivered in standard, commercial containers of the size as called for in the schedule. Each container holding one gallon or more shall be stoppered with a closure having vent.

Pine Oil Disinfectant

1. The product shall be manufactured from pure steam distilled pine oil and emulsifying agent and remain clear and homogeneous under normal and reasonable conditions of storage.
2. It shall contain not less than 60 per cent. by weight steam distilled pine oil.
3. It shall contain not more than 10 per cent. water.
4. The phenol coefficient shall be determined by the F. D. A. Method of Test against B. typhosus and be clearly stated on the label attached to each shipping container.
5. It shall not contain kerosene or other petroleum distillates.
6. The product shall make a stable emulsion in water of zero hardness at 20° C. (68° F.) when diluted at the rate of 5 per cent. The emulsion shall stand for at least twenty-four hours showing no sign of oil float (unsaponified or clear free oil).

Emulsifying Coal Tar Disinfectant

1. It shall contain not less than 65 per cent. by weight of oils and acids from coal tar.
2. It shall contain not over 10 per cent. water.
3. It shall not contain kerosene or other petroleum distillates.
4. The phenol coefficient shall be determined by the F. D. A. Method of Test against B. typhosus and shall be clearly stated on the label attached to each shipping container.
5. It shall make milky emulsions with water of zero hardness at 20° C. (68° F.) when diluted in the ratio of 5 parts disinfectant with 95 parts of water for disinfectants of coefficient 10 or under; and in the ratio of 2 parts of disinfectant to 98 parts of water for disinfectants over 10 in coefficient; these emulsions shall show not more than a trace of oily float or sediment when stored for 5 hours at room temperature.
6. It shall remain limpid, showing no sign of naphthalene crystallization down to 0° C. in 12 hours.
7. It shall contain less than 5 per cent. benzo-phenol.
8. The disinfectant shall stand indefinitely, showing no separation, no loss of germicidal value, or any form of decomposition (such as soap separating from the oil) under normal and reasonable conditions of storage.

Cresylic Disinfectants

1. The product shall be made from that portion of coal tar known as "tar acids" and a soap derived from a fat or oil of vegetable origin.
2. It shall contain not less than 50 per cent. of tar acids, as determined by the method described in U. S. P. XI for the assay of cresol in the Saponated Solution of Cresol.
3. It shall contain not more than 25 per cent. inert ingredients (water plus glycerin, if any).
4. The phenol coefficient shall be determined by the F. D. A. Method using B. typhosus as the test-organism and shall be clearly stated on the label attached to each shipping container.
5. It shall contain less than 5 per cent. of benzo-phenol.
6. It shall make clear solutions with water of zero hardness at 20° C. (68° F.) within the concentration range of from 1 to 4 per cent. Such solutions, when kept in closed containers, shall remain either practically clear or become only slightly opalescent when allowed to stand for 24 hours at 20° C. (68° F.) away from direct light.
7. It shall show no soap separation when cooled down to 0° C. and held at this temperature for 3 hours.

Discuss Carbon Black Uses

Newly discovered properties of colloidal carbon critically affecting its applications in rubber, paints, lacquers and inks, were described by William B. Wiegand, director of carbon research of the Columbian Carbon Co., before the Congress

International de Caoutchouc, world organization of rubber technologists, meeting in Paris. The ionic and hydrolytic adsorptive power of colloidal carbon, Mr. Wiegand reported, affects its pH value and this may now be exactly evaluated. This property is of special significance in rubber, paint, ink and other fields as affecting the character of mixtures of colloidal carbon with other materials.

The principal value of colloidal carbon, according to Mr. Wiegand, lies in its extraordinary development of surface. This high surface development, he continued, imparts strength and wear resistance to mixtures containing colloidal carbon and hence is more valuable than either its blackness or the fact that it is composed of the element, carbon. The particles in each pound of colloidal carbon, Mr. Wiegand stated, have a combined surface area of about fourteen acres, equivalent to three and one-half city blocks in midtown Manhattan.

Solulol Corporation, manufacturer of textile oils and finishes, Providence, R. I., is removing to new quarters at 225 Chapman st., where additional equipment has been installed and more manufacturing and storage space will be available.

English Chemists Seek Better Fire-proof for Cloth

Interest in Flame Retardants Stirred by Success of New Processes for Treating Various Textile Materials—Present Materials Unsatisfactory—

Success of the Tootal process for making textiles non-creasing and the lively interest in all sorts of special treatments and finishes on the part of the dyeing and finishing trades has stirred up a series of intensive researches in England to discover a more satisfactory method of rendering fabrics fire-proof, or at least finding a more efficient flame retardant than is now on the market. Work along these lines is being carried on not only by the larger British chemical manufacturing houses, but also by a number of makers of all sorts of textile specialties.

All flame-proofing compounds contain one or more of the following ingredients: Ammonium carbonate, ammonium chloride, ammonium phosphate, ammonium sulfate, borax, boric acid, dibasic sodium phosphate, sodium tungstate, alum, aluminum acetate, aluminum tungstate, lead acetate, sodium aluminate, sodium stannate, and zinc sulfate. The first eight compounds are the best known, though they are water soluble.

The materials in common use have certain disadvantages which recent research has been endeavoring to overcome. One disadvantage is the development of acidity in the fabric. Unstable ammonium salts (usually phosphate or sulfate) hydrolize and decompose, releasing ammonia. Humidity is sufficient over a period of time to form sulfuric and phosphoric acids in sufficient amounts to tender the cloth. These acids may also react with dyes and finishing compounds, thus affecting color, sheen, and handle. High alkalinity is also objectionable.

A second difficulty is crystallization and powdering of deposited salts. This not only gives the fabric an unpleasant clouded appearance, but also continually reduces flame-proofness. Fabrics with sheen are especially subject to this occurrence. It is rare on rough fabrics.

Removal of the flame-proofing agent by continued dry cleaning is another disadvantage. The mechanical action of cleaning fluids is the principal cause here, acting on non-adhesive crystal deposits. It is also desirable, of course, to obtain some degree of water resistance within the limits of the one-bath process.

Among recent developments are the "Faspos" compounds by Imperial Chemical Industries. According to the *Manchester Guardian*, these compounds are based on monammonium phosphate as fireproof agent and they contain, in addition, fungicides and penetration accelerants.

A new flame-proofing agent said to overcome to a great degree the above difficulties and, in addition, to have certain advantages combines in stable and neutral form the most effective ingredients of old compounds. It is a water-white liquid "resin," soluble only in water. Its viscosity is greater than glycerin; its specific gravity is 1.68. It is odorless, of slightly salty taste, and non-toxic. When spread on a surface it dries to form a smooth, glossy, transparent film. It is non-hygroscopic at ordinary humidities. It dissolves easily and completely in water above 130 degrees F. Chemically it is an inorganic complex boro-phosphate.

The boro-phosphate "resin" contains no ammonia. The progressive acidity of the ordinary salt mixtures is therefore entirely impossible. However, it does contain in high proportion the most desirable ingredients—namely, borate and phosphate radicals. Of importance also in preventing high acidity or alkalinity is the fact that this boro-phosphate acts as a chemical buffer in solution.

New Tar Remover

The Curran Corp., Malden, Mass., manufacturers of "Gunk," have put on the market a new water-white solvent for removing tar specks from automobile and bus bodies. "Tarlene" is said to be a selective solvent on tar and wax and does not affect hard paint, lacquer or enamel surfaces.

New Wood Stain Solvent

WDS Solvent for the preparation of permanent wood stains, is now offered by du Pont (Ammonia Dept.). It combines the non-grain raising characteristics of oil stains and penetrating stains, the fast drying properties of spirit stains, and the permanence, penetration and depth of color of the widely-used water or acid stains, and is used with the dyes employed in the preparation of water stains. Stain solutions prepared with WDS Solvent are said to be clear, permanent and non-corrosive. In their preparation, excess dye material settles rapidly in a non-flocculent, easily separable state. The new solvent is also applicable in formulating light-fast, transparent colored varnishes and lacquers. It is anhydrous, stable, and non-corrosive.

Niagara Sprayer and Chemical Co. is constructing a new factory-type building at Middleport, N. Y., to be used as an office building to replace its present structure.

Harry Cole Dies

Harry Walter Cole, vice-president of Baird & McGuire, Inc. (coal-tar crudes and disinfectants), Holbrook, Mass., died June 15 in Augusta, Ga. His whole life was spent in the coal-tar chemical field,

for after graduating from Georgetown University he was with Kretol from 1905-13, Barrett from 1914-22 and since then with Baird & McGuire.

Mr. Cole, who lived at 80 Willow ave., Wollaston, was born in Frederick, Md., fifty-five years ago.

He was past president of the National Association of Insecticides and Disinfectant Manufacturers; past patron of the Quincy Chapter, O.E.F.; and member of Wollaston and Rural Lodges of Masons. He also belonged to Mount Wollaston Royal Arch Chapter, Quincy Commandery, Knights Templar; Scottish rite bodies; Aleppo Temple; and the Jewel Club, Quincy Chapter. He was a 32d degree mason. Surviving are a son, Allan Cole, and a daughter, Edith L. Cole, both of Wollaston.

O. G. Carter Dead

Oliver Goldsmith Carter, president of C. W. H. Carter, Inc., manufacturers of lithographic varnishes and specialties for the manufacture of printing ink, died suddenly June 21 of a heart attack. He was 63 years old and resided at 1,440 Albemarle road, Brooklyn, N. Y.

Mr. Carter was born in Brooklyn, the son of C. W. H. Carter, who founded the business in 1865. With his brother, the late C. Harris Carter, he incorporated the business in 1909 and became president and treasurer. He was a member of Emanuel Lodge, 636, F. and A. M., and the Crescent Athletic Club.

Surviving are his widow, Mrs. Cora C. G. Carter, long prominent in Brooklyn club and social circles, and three children, Stella Rae, George V. C. and Oliver G. Carter, Jr.

B. T. Babbitt, Inc., New York, has announced sales increase of 400 per cent. and "500,000 new customers" for Bab-O cleaner in the last three months.

★

TRIBUTYL CITRATE

$(CH_2COOC_4H_9)_2C(OH)COOC_4H_9$

TRIBUTYL CITRATE is a stable, odorless, non-volatile liquid. It is miscible with most organic liquids and is an excellent solvent for a wide variety of materials.

Tributyl Citrate possesses outstanding advantages as a plasticizer for nitrocellulose lacquers, imparting resistance to oils and greases and improving adherence of the films. It is a good plasticizer for cellulose acetate as well as for many resins. The solvent and plasticizing properties of Tributyl Citrate make it of interest in the formulation of lacquers, dopes, inks, spirit varnishes, polishes, and similar preparations.

Tributyl Citrate is an efficient anti-foam agent for water dispersions, and this property indicates numerous industrial applications.

We shall be glad to send you a sample and complete technical data. The facilities of our laboratories are available for cooperation in any work involving the use of this material.

PROPERTIES

Purity: Not less than 99% ester, by weight.

Specific Gravity: 1.043 to 1.049 at 20° C./20° C.

Acidity: Not more than 0.2%, calculated as citric acid.

Water: No turbidity when one volume is mixed with 19 volumes of 60° Bé. gasoline at 20° C.

Color: Light straw.

Molecular Weight: 360.25.

Melting Point: −20° C.

Boiling Point: Approximately 233.5° C. at 22.5 mm. of mercury.

Flash Point: 185° C. (365° F.).

Solubility in Water: Tributyl Citrate and water are mutually insoluble and immiscible.

Weight per U. S. Gallon: 8.7 pounds at 68° F.

Refractive Index: 1.40912 at 20° C.

COMMERCIAL SOLVENTS CORPORATION U.S.A.

COMMERCIAL SOLVENTS CORPORATION

NEW YORK CENTRAL BUILDING, NEW YORK, N. Y.

PLANTS: TERRE HAUTE, INDIANA; PEORIA, ILLINOIS; WESTWEGO, LOUISIANA; HARVEY, LOUISIANA; AGNEW, CALIFORNIA

PROMPT SERVICE FROM BRANCH OFFICES AND WAREHOUSES

Chemical Specialty Patents

Production emulsions in which ethereal poly-compounds of at least one polyhydric alcohol partially esterified with acids are emulsified with water or aqueous solutions of any substances in presence of substances having an alkaline reaction. No. 20,361. Reissue. Hans Schrader, Essen-Ruhr, Germany, to Th. Goldschmidt A.-G., both of Essen-Ruhr, Germany.

Apparatus for applying adhesives to materials, for coating surfaces, or in manufacture of coated or compound materials. No. 2,077,535. Gabriel Smith, Leyton, England.

Dry cleaning clothes with volatile solvents in a scouring apparatus; transmitting used solvent through a filter, thence past a column of activated magnesia back to scouring apparatus. No. 2,077,857. Max Y. Seaton, Greenwich, Conn., to Westvaco Chlorine Products Corp., New York City.

Solvent for dissolving ink in a process of tranferring designs, etc., comprising a fluorochloroethane and a non-volatile miscible organic liquid. No. 2,077,874. Paul V. Brower, Maywood, Ill., to Ditto, Inc., Chicago, Ill.

Composition of matter yielding films; comprising a metallic soap, sulfur and hydrogenated derivatives. No. 2,077,875. Edmond H. Bucy, Waukegan, Ill., to Atlas Powder Co., No. Chicago, Ill.

Detergent composition containing a detergent having a cleansing action and an alkali metal salt of a thiotetraphosphoric acid. No. 2,078,071. Augustus H. Fiske, Warren, R. I., to Rumford Chemical Works, Rumford, R. I.

Preparation flexible stretchable base film comprising a wax and a rubber, having an adherent, flexible non-tacky coating. No. 2,078,172. Allen Abrams, Geo. W. Forcey, and Geo. J. Brabender, Wausau, Wisc., to Marathon Paper Mills Co., Rothschild, Wisc.

Production drying oils; polymerizing a polymerizable open-chain acetylene polymer in presence of an ester of a drying oil acid, and stopping polymerization before an insoluble gel is formed. No. 2,078,194. Arnold M. Collins to du Pont, both of Wilmington, Del.

Abrasive grinding wheel, comprising abrasive grains distributed in and bonded solely by vulcanized rubber. No. 2,078,354. Duane E. Webster to Norton Co., both of Worcester, Mass.

Production an oleo-resinous flat varnish containing an insoluble metallic soap of fatty acids of Japan wax. No. 2,078,389. Orville L. Kinder to Advance Paint Co., both of Indianapolis, Ind.

Recovery phosphatides from soap stock; treating cotton seed oil soap stock with a soap and oil solvent, in final step washing with an aqueous solution. No. 2,078,428. Benjamin H. Thurman, Yonkers, N. Y., to Refining, Inc., Reno, Nev.

Manufacture abrasive wheels. Nos. 2,078,436-7. Harry O. Anderson to Norton Co., both of Worcester, Mass.

Mothproofing compositions comprising aluminum naphthenate and a solvent. No. 2,078,458. Theron P. Remy, Los Angeles, Calif., to Texas Co., New York City.

Wood preservative oil; impregnating wood with solution of creosote in a petroleum oil acid sludge distillate oil. No. 2,078,570. August Holmes, Elizabeth, N. J., to Standard Oil Development Co., corporation of Del.

Friction element and bond therefor. No. 2,078,617. Ray E. Spokes, Ann Arbor, Mich., to American Brakeblok Corp., New York City.

Production coal process soap; using caustic solution and a vegetable oil. No. 2,078,726. Carl H. Haurand, No. Plainfield, N. J., to Best Foods, Inc., New York City.

Wood preservative composition consisting of a water-soluble sodium salt of hydrofluoric acid and a water-soluble salt of chromic acid. No. 2,078,826. Karl Wolman, Berlin-Grunewald, and Hans Pflug, Berlin-Wilmersdorf, Germany, to American Lumber & Treating Co., Chicago, Ill.

Manufacture abrasive articles comprising abrasive grain and a heat-hardened resin-containing bond modified by pulverized fused quartz. No. 2,078,830. Raymond C. Benner, and Walter D. Rossow, Niagara Falls, and Osborne L. Mahlman, Kenmore, N. Y., to Carborundum Co., Niagara Falls, N. Y.

Manufacture abrasive coated products; coating a backing material with a liquid resin and applying abrasive grains and a catalyst for curing the resin. No. 2,078,831. Raymond C. Benner and Romie L. Melton to Carborundum Co., all of Niagara Falls, N. Y.

Presaponified buffing compound. No. 2,078,876. Mary F. Hennessey to Puritan Mfg. Co., both of Waterbury, Conn.

Production artificial cork composed of a granular cork base, and a binding material containing latex and blood albumen. No. 2,078,954. Michael Levin, Balto., Md., to Jacob T. Basseches, New York City.

Preparation firm, turpentine-free wax polishing composition. No. 2,078,-971. John D. Pickens and Theodore Richard Thompson, Flint, Mich., to du Pont, Wilmington, Del.

Pigment paste for carbon papers, typewriter ribbons, etc. No. 2,079,-229. Walther Schrauth, Berlin-Dahlem, Germany, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.

Seal for containers; coating composition comprising an aqueous dispersion of rubber, bentonite, karaya, having in solution ammonia and zinc-ammonium benzoate. No. 2,079,319. Wilfrid Andrew Kalber, Somerville, Mass.

Seal for containers; sealing element composed of rubber, the flocculated resultant product of the zinc cation with bentonite and titanium dioxide, and the water resistant resultant product of the zinc cation with ammonium alginate and casein. No. 2,079,320. Wilfrid Andrew Kalber, Somerville, Mass.

Preparation chemical products useful as cleansing, softening and scouring agents; reacting an unsaturated long chain alcohol having 10 to 20 carbon atoms per molecule with an alkali metal pyrosulfate and an amine. No. 2,079,347. Anthony James Hailwood, Altrincham, England, to Imperial Chemical Industries, Ltd., London, England.

Treatment tobacco by application of formamide. No. 2,079,623. Paul La Frone Magill, Ransomville, N. Y., to du Pont, Wilmington, Del.

Production synthetic resin varnishes and synthetic resins; using formaldehyde, phenol a volatile organic solvent, and a fatty oil acid in process. No. 2,079,626. Howard Houlston Morgan, Slough, and Alan Ashby Drummond, Iver, England, to Imperial Chemical Industries, Ltd., London, England.

Shoe having a stitched channeled outsole with the flap permanently united to the sole margin with a pyroxylin cement, composed of toluol, butyl acetate, alcohol, nitrated cotton, resin, and plasticizer. No. 2,079,-706. Hiram Gordon to Walker T. Dickerson Co., both of Columbus, O.

Aqueous germicidal and antiseptic composition containing alkyl phenols. No. 2,079,772. Reuben Schuler, Elizabeth, N. J., to Stanco, Inc.

Non-corrosive detergent composition, comprising isopropyl alcohol, an oil-soluble sulfonate, and water. No. 2,079,793. Theodore R. Donlan, Irvington, N. J., to Stanco, Inc.

Non-gelling emulsifiable textile oil, comprising a mineral oil, an oil soluble sulfonate emulsifier, a lower aliphatic alcohol amine, and a carboxylic acid. No. 2,079,803. John B. Holtzclaw, Roselle, and Carl Winning, Elizabeth, N. J., to Standard Oil Development Co., corporation of Del.

Weed killing composition comprising uncombined sulfur dissolved in a petroleum oil base containing unsaturated constituents. No. 2,079,827. Wm. Hunter Volck, Watsonville, Calif., to Calif. Spray-Chemical Corp., Berkeley, Calif.

Fur carroting solution comprising an aqueous solution of a carroting metal salt, a reducing agent, containing an amino group, and nitric acid. No. 2,079,860. Hans O. Kauffmann to Buffalo Electro-Chemical Co., Inc., both of Buffalo, N. Y.

Binding agent for paints, lacquers, and varnishes, consisting of a mixture of raw drying oil, phthalate resin, and chlorinated rubber dissolved in a solvent. No. 2,079,951. Jacobus Rinse, Overveen, Netherlands, to Naamlooze Vennootschap tot voortzetting der zaken van Pieter Schoen & Zoon, Zaandam, Netherlands.

Dispenser for soap, etc. No. 2,080,343. Herbert W. Smith, West Newton, Mass., to Bostonia Products Co., Boston, Mass.

Metal etching mordant having therein a water solution containing potassium dichromate, hydrochloric acid, nitric acid, sulfuric acid, and liquid castile soap. No. 2,080,348. Edward C. Truitt, Belleville, N. J.

Preparation weed-killing and soil fertilizing solution for eradicating poison ivy comprising sodium hydroxide, sodium nitrate, and water. No. 2,080,378. Wm. Quinn, Ottawa, Ill.

Insecticidal preparation comprising an aromatic isothiocyanate in which the isothiocyanate radical is directly attached to an aromatic nucleus. No. 2,080,770. Stefan Goldschmidt, Karlsruhe, and Karl Martin, Bruchsal, Germany, to Kessler Chemical Corp., New York City.

Production adhesive composition comprising flour of hulls of coffee beans, an aqueous alkaline medium and carbon bisulfide. No. 2,080,832. Geo. H. Osgood and Russell G. Peterson, Tacoma, Wash.

Free-flowing emulsion liquid polish, comprising mineral spirits, light mineral oil, natural castor oil, ricinoleic acid, water, water solution of potassium hydroxide and "Lannette Wax." No. 2,081,073. Leroy W. Shuger to Balto. Paint & Color Works, both of Balto., Md.

Drier comprising a water-insoluble soap of a drying metal and an organic alcohol derivative stabilizer. No. 2,081,407. Arthur Minich, Newark, N. J., to Nuodex Products Co., Inc., New York City.

Improving liquid potassium soaps; adding to soap a mixture of potassium and sodium metaphosphates in which molecular proportions of pot. metaphosphate to sod. metaphosphate exceeds 1:1. No. 2,081,617. Fritz Draisbach, Ludwigshafen-am-Rhine, Germany, to Hall Labs., Inc., Pittsburgh, Pa.

Method impregnating wood, etc., to resist insect and fungi attack, with a solution containing as a toxicant, beta naphthol in petroleum oil solvents. No. 2,081,828. Frank H. Lyons to E. L. Bruce Co., both of Memphis, Tenn.

Method printing on an article with a printing ink which does not dry on the press, and which contains a pigment dispersed in a solution of nitrocellulose dissolved in dimethyl phthalate. No. 2,081,949. Walter W. Mock, Rutherford, N. J., to International Printing Ink Corp., New York City.

Mothproofing detergent composition for simultaneously cleaning and rendering mothproof wool, feathers, hair, etc., which is only slightly colored in the dry state and soluble in water; composed of a neutral soapy washing agent and a water-soluble mothproofing agent. No. 2,082,-188. Hermann Stötter, Leverkusen, and Theodor Hermann, Leverkusen-Wiesdorf, Germany, to Winthrop Chemical Co., Inc., New York City.

Manufacture miscible gum from drying oils; using Chinawood oil, lead and cobalt acetates, linseed oil, and calcined magnesium oxide in process. No. 2,082,371. Edw. M. Williams, Elyria, O.

Manufacture drying oil product consisting of a glyceride drying oil and formaldehyde. No. 2,082,515. Frank Brian Root, Caldwell, N. J.

Preparation waterproof fabric, applying to fabric thin coat of a dispersion of rubber in gasoline, removing gasoline, dusting with powdered mica, removing surplus, and applying plurality of coats of latex containing rubber. No. 2,082,559. Morgan J. Vittengl, Fairfield, Conn., to du Pont, Wilmington, Del.

Production textile assistant compositions which are free of sodium sulfate; containing water, an alkali metal salt of sulfated oleyl acetate, and an organic salt. No. 2,082,576. Clyde O. Henkel and Wm. H. Lockwood to du Pont, all of Wilmington, Del.

Production flexible, waterproof fabric, impregnating with composition containing cellulose derivative, dibutyl phthalate, ceresin wax, paraffin oil, ethyl acetate, ethyl alcohol, and toluene; applying to one side of impregnated fabric continuous film composed of cellulose nitrate, a softener, and pigment dispersed in an organic dispersing agent. No. 2,082,-592. Edgar Hugo Nollau to du Pont, both of Wilmington, Del.

Preparation germicide; condensing cresol with an amyl alcohol to produce amylated cresol. No. 2,082,625. Merrill C. Hart to Upjohn Co., both of Kalamazoo, Mich.

Production wood preservative or like, comprising a pitch from the class of coal tars and rosin pitch. No. 2,082,885. Jacquelin E. Harvey, Jr., Cogdell, Ga., one-half to Southern Wood Preserving Co., Atlanta, Ga.

Production gypsum stucco for use in manufacture of wall plasters. No. 2,082,887. Osborne Haydon to American Gypsum Co., both of Port Clinton, O.

Detergents: method preparing dry-stable mixture of a desired hydrated sodium metasilicate and a compatible sodium metaborate. No. 2,082,936. Chester L. Baker, Berkeley, Calif., to Phila. Quartz Co., Phila., Pa.

Wax-like potting composition; comprising a wax-like halogenated polycyclic hydrocarbon, a bitumen, and an organic wax. No. 2,083,007. Myron E. Delaney, Summit, N. J., to Halowax Corp., New York City.

Patents digested include issues of the "Patent Gazette," April 20 through June 8 inclusive.

(*Continued from Page 72*)

391,278. I. F. Laucks, Inc., Seattle, Wash.; Apr. 13, '37; under or priming coat for wood, cement, etc., and for a filler, sealer, and grain raising inhibitor for lumber and plywood; use since Apr. 7, '37.

391,397. Puritan Soap Co., Rochester, N. Y.; Apr. 15, '37; polishing wax; use since Jan. 30, '35.

391,686. Cavendish Trading Corp., New York City; Apr. 22, '37; waxes for polishing floors, automobiles, and furniture; use since Oct. 1, '36.

391,866. Illinois Farm Supply Co., Chicago, Ill.; Apr. 26, '37; house paint primers; use since July 10, '36.

392,027. Glidden Co., Cleveland, O.; Apr. 29, '37; varnish enamel; use since Oct. 29, '36.

"HOLDS-UM"
356,904

PICKLETT
375,738

NATIONAL PEST PATROL
376,058

STANFLEET
377,028

PATTINSON'S
378,533

RIDOSOL
379,283

Rayglow
PAINT PRODUCTS
379,341

LUSTROSIZE
379,830

ACETOQUINONE
383,349

RADIANT
381,233

382,431

SYNTHELITE
389,949

COCK
383,350

K
383,351

PERMATOL
383,873

DEstainER
384,265

MAGNET
FINISHES
385,248

PURE-O-CLORE
387,092

PENETROL
387,408

VITOL
387,409

INSECTI-SOL
388,279

PEPPER
GASOLINE
388,475

INSL-X
388,549

CHEM-X
389,966

The Cool Water
SOAP
For Cool Water Washing
388,787

Kota Kolor
388,828

BOWLADE
389,205

LAUX REZITE SEALER
389,520

SPAX
389,521

X-ODE
389,525

LOXON
389,645

IMPERIAL
389,649

PRODUCTION
389,651

TEC
389,700

LINOLA
389,732

VC
389,892

VC
389,893

PEERCO
390,024

DEPENDON
390,115

AKOUSTOLITH
390,121

Paragear
390,233

356,904. Clinton J. Herron (The "Holds-Um" Co.), Royal Oak, Mich.; Oct. 9, '34; adhesive cement; use since Jan., '32.
375,738. W. I. B. Co., Chicago, Ill.; Mar. 7, '36; preparation for treating woods to lighten color, harden soft woods, and make wood resistant to decay, etc.; use since Nov. 30, '35.
376,058. Chas. Menard (National Pest-Patrol Products), San Francisco, Calif.; Mar. 16, '36; insecticides and rodent exterminator; use since Feb. 23, '35.
377,028. Standard Oil Co. of N. J., Wilmington, Del.; Apr. 9, '36; petroleum oils; use since Mar. 11, '36.
378,533. Turner & Newall, Ltd., Roachdale, England; May 16, '36; magnesium carbonates and calcined magnesium oxides; use since 1851.
379,283. American Chemical Paint Co., Ambler, Pa.; June 4, '36; liquid emulsifying preparations used in industrial alkaline cleaning baths; use since May 14, '36.
379,341. Philip Hantman (Rayglow Paint Co.), Brooklyn, N. Y.; June 5, '36; paints and paint products; use since Jan. 1, '35.
379,830. Jean Coll, New York City; June 17, '36; sizing and stiffening liquid for textiles and straw materials; use since Jan. 15, '32.
383,349. Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann, Paris, France; Sept. 17, '36; dyestuffs; use since Aug. 14, '36.
381,233. Midway Chemical Co., Chicago, Ill., assignor to Wizard, Inc., corp. of Del.; July 20, '36; stove polish, shoe cleaner and polish, wall paper cleaner, rug and carpet cleaner, dry cleaning fluid, and metal cleaners and polishes; use stove polish since May 12, '30; shoe cleaner and polish since Apr. 28, '31; wall paper cleaner since Sept. 29, '28; rug and carpet cleaner since Jan. 31, '35; dry cleaning fluid since Feb. 10, '27; and metal cleaners and polishes since June 30, '25.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, May 18 to June 8.

382,431. Kuhne-Libby Co., New York City; Aug. 21, '36; ceresin; use since Nov. 13, '34.
389,949. Vita Var Corp., Newark, N. J.; filed Mar. 11, '37; paints, varnish, and paint enamels; use since Jan. 29, '37.
383,350. Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann, Paris, France; Sept. 17, '36; dyestuffs; use since Aug. 20, '36.
383,351. Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann, Paris, France; Sept. 17, '36; dyestuffs; use since Aug. 20, '36.
383,873. A. D. Chapman & Co., Chicago, Ill.; Oct. 2, '36; toxic chemical solution for treating wood and cellulose products to protect them from attacks by insects and fungi; use since Sept. 21, '36.
384,265. Noskrape Labs., Inc., Chicago, Ill.; Oct. 12, '36; detergents for cleaning terrazzo, terra cotta, porcelain, Bakelite, glass, etc.; use since Aug. 25, '36.
385,248. Louis Brod (Magnet Paint & Shellac Co.), Brooklyn, N. Y.; Nov. 7, '36; paints and shellac; use since Jan. 1, '30.
387,092. Jacob H. Simon (Clor-O-Clean Chem. Co.), Chicago, Ill.; Dec. 23, '36; household cleaning preparation; use since June 1, '36.
387,408. Turco Products, Inc., Los Angeles, Calif.; Jan. 2, '37; industrial and household cleaning preparations; use since Apr. 3, '34.
387,409. Turco Products, Inc., Los Angeles, Calif.; Jan. 2, '37; cleaning preparations with incidental polishing properties; use since June 9, '32.
388,279. Pennsylvania Refining Co., Butler, Pa.; Jan. 28, '37; deodorized kerosene; use since July 1, '35.
388,475. Ashland Refining Co., Ashland, Ky.; Jan. 28, '37; gasoline and lubricating oils; use since July 1, '33.
388,549. Howard Elmer Smith, Englewood, N. J.; Feb. 4, '37; lacquers and paint enamels; use since Feb. 3, '37.
389,966. Isidore Primost (Chem-X Research Labs.), Elmhurst, L. I., N. Y.; Mar. 12, '37; soot destroyers, boiler scale removers, water cleaning compounds, oil burner nozzle cleaners; use since Feb. 2, '37.
388,787. Los Angeles Soap Co., Los Angeles, Calif.; Feb. 11, '37; granulated laundry soap; use since Feb. 1, '36.
388,828. Lyman W. Carr, Fostoria, Ohio; Feb. 12, '37; coating polishes, having properties of a cleaner for automobile bodies, furniture, and varnished, lacquered, painted or enameled surfaces; use since Oct., '36.
389,205. Whitlock Chemical Co., Springfield, Ill.; Feb. 20, '37; cleaner for toilet bowls; use since July 1, '35.
389,520. I. F. Laucks, Inc., Seattle, Wash.; Mar. 1, '37; under or priming coat for wood, cement, plaster or brick, and for a filler, sealer, and grain raising inhibitor for lumber and plywood; use since Dec. 4, '36.
389,521. I. F. Laucks, Inc., Seattle, Wash.; Mar. 1, '37; spactling compound; use since Feb. 16, '37.
389,525. Products, Inc., Columbus, Ohio; Mar. 1, '37; deodorizing and disinfecting preparation; use since Nov. 15, '35.
389,645. Loxon Corp., Minneapolis, Minn.; Mar. 4, '37; ready mixed paints, especially primers and sizes; use since Jan. 25, '37.
389,649. Minnesota Mining & Mfg. Co., St. Paul, Minn.; Mar. 4, '37; abrasive cloth and abrasive paper; use since 1905.
389,651. Minnesota Mining & Mfg. Co., St. Paul, Minn.; Mar. 4, '37; abrasive cloth and abrasive paper; use since Jan., '25.
389,700. Tennessee Eastman Corp., Kingsport, Tenn.; Mar. 5, '37; plastic molding compositions in the form of powder, slabs, sheets, or granules; use since Jan. 1, '33.
389,732. Hall Hardware Co., Minneapolis, Minn.; Mar. 6, '37; linoleum varnish; use since Jan. 28, '37.
389,892. Virginia Carolina Chemical Corp., Richmond, Va.; Mar. 10, '37; trisodium phosphate, disodium phosphate duohydrate, phosphoric acids, sulfuric acid, etc.; use since Dec., '33.

GroSo
390,295

Paragloss
390,234

Parakleen
390,236

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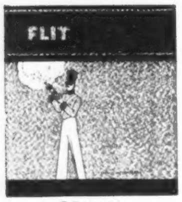
390,283

SYNOIL
390,303

Raceway GRAFITE
390,317

SILK-O-RAY
390,331

Professional
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SERNTAN
390,388

OREMUS
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Milliemaid
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LEKTROLITE
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LYOFIX
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STANWAX
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SOFTONE
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THERMALKOTE
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STETSOL
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CARBOSEAL
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Essowax
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CARBO FIZZIK
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SEM-I-GLO
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Paraseal
390,754

PARADENE
390,800

CO-OP
390,812

ENAMELUX
390,838

TOPS
390,844

SPRY
390,847

Panesso
390,872

NU-BRITEN
390,874

ACTIROTE
390,916

CATABOND
390,949

FLOTO
391,005

Neva-Wetized
391,034

SNO-MAN

391,073

VELLO-ITE
391,132

MERTOL
391,188

REZ-IT
391,278

P.S.
391,397

Cavencraft
391,686

SOYSEAL
391,866

HAMMERLOID
392,027

389,893. Virginia Carolina Chemical Corp., Richmond, Va.; Mar. 10, '37; trisodium phosphate, disodium phosphate duohydrate, phosphoric acids, sulfuric acid, etc.; use since Jan. 29, '37.
390,024. Peerless Paint & Chemical Corp.; Pittsburgh, Pa.; Mar. 13, '37; paints, enamels, and varnishes; use since Mar. 8, '37.
390,115. Dependon Roofing Co., Chicago, Ill.; Mar. 16, '37; thermal insulating material; use since Feb. 16, '36.
390,121. R. Guastavino Co., Boston, Mass.; Mar. 16, '37; artificial stone having property of absorbing sound; use since 1918.
390,233. Paragon Oil Co., Inc., Brooklyn, N. Y.; Mar. 18, '37; lubricating oils and greases for gears; use since Nov. 2, '36.
390,295. Chase & Co., Sanford, Fla.; Mar. 15, '37; fertilizers; use since Apr. 20, '34.
390,234. Paragon Oil Co., Inc., Brooklyn, N. Y.; Mar. 18, '37; automobile and furniture polish; use since Sept. 1, '36.
390,236. Paragon Oil Co., Inc., Brooklyn, N. Y.; Mar. 18, '37; solvents for dry cleaning purposes; use since Apr. 24, '34.
390,283. Stanco, Inc., New York City; Mar. 19, '37; insecticides and fungicides; use since Apr. 17, '36.
390,303. American Cyanamid & Chemical Corp., New York City; Mar. 20, '37; chemical compounds for use in fat-liquoring and softening leather; use since Nov. 17, '36.
390,317. Janet J. Haigh (Raceway Oil Co.), Chicago, Ill.; Mar. 20, '37; lubricating oils; use since Jan. 5, '37.
390,331. Onyx Oil & Chemical Co., Jersey City, N. J.; Mar. 20, '37; preparation for application to all kinds of fabrics to impart thereto a silky hand and scroop or crunch; use since July 1, '36.
390,356. Cleveland Cleaner & Paste Co., Cleveland, O.; Mar. 22, '37; wall paper cleaner; use since Feb., '36.
390,388. Swan-Finch Oil Corp., New York City; Mar. 22, '37; lubricating oils; use since Sept. 25, '36.
390,449. A. Gross Candle Co., Inc., Balto., Md.; Mar. 24, '37; candles; use since Feb. 5, '37.
390,463. Miller Products, Inc., Attica, Ind.; Mar. 24, '37; cleaning preparation for painted surfaces, rugs, fabrics, and linoleum; use since Mar. 1, '37.
390,468. Platinum Products Corp., New York City; Mar. 24, '37; fluids for lighters; use since June 1, '33.
390,473. Society of Chemical Industry in Basle, Basel, Switzerland; Mar. 24, '37; auxiliary agents for use in textile industry; use since Jan. 18, '37.
390,476. Standard Oil Co. of N. J., Wilmington, Del.; Mar. 24, '37; paraffin wax; use since Jan. 16, '37.
390,501. John Guy Britton, Lansdowne, Pa.; Mar. 25, '37; sound absorbent plastic material in dry, liquid and rigidly set forms; use since Feb. 21, '37.
390,513. Flintkote Co., New York City; Mar. 25, '37; bituminous emulsions for use as protective coatings; use since Sept. 30, '36.
390,533. John B. Stetson Co., Phila., Pa.; Mar. 25, '37; processing fluid for treatment of felt, wool, silk, etc., to render such fabrics stain and perspiration proof; use since Mar. 4, '37.
390,543. Carbide & Carbon Chemicals Corp., New York City; Mar. 26, '37; hygroscopic glycol compositions for use as anti-freeze and other purposes; use since Dec. 18, '35.
390,544. Certified Core Oil & Mfg. Co., Chicago, Ill.; Mar. 26, '37; core oils; use since Apr., '36.
390,566. Standard Oil Co. of New Jersey, Wilmington, Del.; Mar. 26, '37; paraffin wax; use since Feb. 2, '37.
390,666. Publicker, Inc., Phila., Pa.; Mar. 29, '37; compound for removing carbon deposits in combustion chambers of automobile engines and other combustion engines; use since Mar. 12, '37.
390,691. H. B. Davis Co., Balto., Md.; Mar. 30, '37; paints, enamels, stains, lacquers, and varnishes; use since Nov. 28, '32.
390,754. Socony-Vacuum Oil Co., Inc., New York City; Mar. 31, '37; wax derived from petroleum; use since Mar. 5, '37.
390,800. Neville Co., Neville Island, Pa.; Apr. 1, '37; prepared floor tile base consisting of resins derived from crude heavy solvent naphtha and materials of plastic nature analogous to asphalt; use since Jan. 1, '34.
390,812. Sherwin-Williams Co., Cleveland, O.; Apr. 1, '37; paints, enamels, lacquers, Japans, varnishes, etc.; use since Jan. 15, '37.
390,838. John P. Cochran Co., Cleveland, O.; Apr. 2, '37; paint-enamels and varnishes; use since Mar. 13, '37.
390,844. Derris, Inc., New York City; Apr. 2, '37; toilet bowl cleaner; use since Mar. 10, '37.
390,847. Derris, Inc., New York City; Apr. 2, '37; toilet bowl cleaner; use since Feb. 5, '37.
390,872. Standard Oil Co. of N. J., Wilmington, Del.; Apr. 2, '37; hydrocarbon gases for industrial and commercial purposes; use since Mar. 4, '37.
390,874. U. S. Gypsum Co., Chicago, Ill.; Apr. 2, '37; calcimine; use since Apr., '36.
390,916. Hammond Paint & Chemical Co., Beacon, N. Y.; Apr. 3, '37; insecticides; use since Mar. 15, '36.
390,949. Catalin Corp. of America, Fords, N. J.; Apr. 5, '37; liquid preparation of phenolic resin used as an adhesive, particularly as a wood glue and for lamination; use since Feb. 3, '37.
391,005. Hercules Powder Co., Wilmington, Del.; Apr. 6, '37; flotation reagent for ores or minerals; use since Oct. 12, '23.
391,034. Neva-Wet Corp. of America, Inc., New York City; April 7, '37; processing fluids for treating laundered articles of all kinds to render them water repellent; use since Mar. 19, '37.
391,073. L. H. Kassel & Co. (L. H. Kassel Mfg. Co.), Ft. Worth, Tex.; Apr. 8, '37; powdered borax; use since Feb. 20, '37.
391,132. I. F. Laucks, Inc., Seattle, Wash.; Apr. 9, '37; cold water paints and calcimines; use since Dec. 1, '36.
391,188. McKesson & Robbins, Inc., Bridgeport and Fairfield, Conn.; Apr. 10, '37; germicide and antiseptic; use since Apr. 7, '37.

(*Continued on Page 68*)

U. S. Dye Output Passes the 1929 Record Production

Tariff Commission's Coal-tar Census Reveals Growth in All Classes of Organic Chemicals—Naphthalene and Phthalic at New Highs—Germany Slipping in World Dye Trade—

Coal-tar chemicals made new records during 1935. Production in all major divisions of the industry, except synthetic flavors, was greater than for the boom year of 1929. Prices range from 25 to 80 per cent. lower than in 1917.

Outstanding was the increased output of crude naphthalene which in response to the shortage of a year ago jumped 88 per cent., a total of 89,536,202 pounds, according to the Tariff Commission's Coal-tar Census. Phthalic anhydride production reached a total of 31,244,378, reflecting the growth of the alkyd resins; and with this year's increased plant capacity and well sustained consumption, the trade expects the 1937 total to cross the 40 million pound mark.

The Tariff Commission collected statistics for coal-tar crudes from purchasers of tar and from producers of tar by the Bureau of Mines. Output of tar increased about 25 per cent. to 560,385,578 gallons while the quantities distilled amounted to 322,284,912 gallons or 16 per cent. more than in 1935. Production of all crudes obtained from tar increased over the preceding year. Intermediates output totaled 509,705,955 pounds or 16.7 per cent. more than in 1935. There was an appreciable increase in production of intermediates for synthetic resins, such as phthalic anhydride, 33 per cent.; phenol, 12 per cent.; and maleic anhydride about 25 per cent. The volume of para dichlorobenzene increased 40 per cent.; that of refined naphthalene 13 per cent., aniline 18 per cent., and nitrobenzene about 10 per cent.

Output of dyes was 17 per cent. greater than that in 1935 and totaled 119,233,551 pounds of which 15,164,622 pounds were new and unclassified dyes. Synthetic indigo production increased 32 per cent. and sulfur black, 21 per cent. over 1935. Sales of all dyes, as a group, were 20 per cent. greater in 1936 by quantity and 22 per cent. by value than in the preceding year.

Big gains in 1936 were in the production of synthetic resins of coal-tar origin, the total of which was 116,334,635 pounds, with sales of 85,285,926 pounds valued at $16,652,415. The growth of this industry is shown by comparing the 1936 output with the average output for the period 1927-30 of 24,442,000 pounds. Resins derived from tar acids (phenol, cresols, and xylenols) increased in output to 69,382,183 pounds or 30 per cent. more than in 1935. Alkyd resin production totaled 46,952,452 pounds or more than 35 per cent. higher than 1935.

Non-coal-tar synthetic resins totaled 15,611,041 pounds with sales of 14,766,640 pounds valued at $3,591,467. This group includes resins derived from acrylic acid esters, vinyl acetate and chloride, urea and thiourea, petroleum, and other sources. Commercial production of petroleum resins was reported for the first time in 1936. Commercial production of mandelic acid and salts is also reported for the first time.

Synthetic non-coal-tar medicinals increased in sales to 1,205,403 pounds valued at $1,878,944 as compared with 568,839 pounds valued at $1,343,008 in 1935. Interesting developments in this group include commercial production of synthetic thymol, and increased output of synthetic menthol and theophylline derivatives.

Organic color lakes and toners increased 8 per cent. in output, 12 per cent. in sales quantity and 17 per cent. in sales value over 1935. Rubber chemicals of coal-tar origin increased 30 per cent. in output to 30,753,901 pounds, of which 57 per cent. were accelerators and 43 per cent. antioxidants.

Synthetic organics not of coal-tar origin output totaled 2,041,454,244 pounds or 28 per cent. more than in 1935. Sales of $105,831,590 represent an increase of 30.7 per cent. by quantity and 22.6 per cent. by value as compared with the preceding year. Individual products for which increased production is noted include methyl ethyl ketone, more than 100 per cent.; isopropyl alcohol and methanol, more than 40 per cent.; formaldehyde, 25 per cent.; acetone, more than 30 per cent.; carbon tetrachloride, 23 per cent.; ethyl acetate, 27 per cent.; and ethyl alcohol, about 20 per cent.

It is interesting to compare our domestic dye production increase with the figures from Great Britain released at the same time by the British Board of Trade. Their output was up 9 per cent. and details of the 1935-36 statistics follow:

	Pounds	
Dye	1936	1935
Direct cotton	11,443,486	10,494,850
Acid wool	11,932,908	11,398,471
Chrome and mordant (inc. alizarine)	7,767,829	7,254,066
Basic	3,367,983	3,534,079
Sulfide	8,388,398	8,227,626
Vat (inc. indigo)	10,107,823	9,947,252
Lake-making and pigment	2,018,599	1,947,151
Cellulose acetate	2,246,646	1,801,216
Oil, spirit, and wax	1,596,770	1,291,501
Unclassified	2,352,459	2,817,172
Totals	61,222,901	58,713,384

Based on the best data obtainable at this time the Chemical Division of the U. S. Dept. of Commerce estimates world dye production at about 243,000 metric tons last year, the highest annual figure ever recorded (221,500 tons in 1935, and 215,500 tons in 1934). Germany, the United States, Russia, Great Britain, Japan, Italy, France, Switzerland, and Poland continued in the order named, the world's leading producers. While there still exists a considerable trade in certain types of dyes between these countries, all of them appear to have attained a high degree of self-sufficiency. Germany, according to estimates, exports from 40 to 50 per cent. of its production, and it is fairly well established that Switzerland exports as much as 95 per cent. of the total. Estimates place German output at approximately 76,000 metric tons in 1934 compared with 66,000 tons in 1933 and 75,000 metric tons during 1929. Last year and in 1935 qualified observers believe that the 1934 total was attained it not surpassed by German producers. In 1936 Germany's exports of dyes were recorded at 33,743 metric tons, against 33,933 during the preceding year and 33,593 tons in 1934, indicating that Germany is not sharing in the increased world demand for dyestuffs.

While official reports are lacking, Russia is believed to have reached third place as a world producer of coal-tar dyes last year. Soviet reports indicate an output exceeding 25,000 metric tons in 1935, and according to the best information available this was substantially increased in 1936—probably from 15 to 35 per cent. if the planned ouput was attained.

Dye production in Japan has increased steadily in recent years—the total in 1936 reaching 19,368 metric tons (17,116 in 1935, and 7,796 in 1929). Japanese dye makers suffered a shortage of raw materials during the early part of 1937—benzol, toluol, cresol and other tar products.

Figures on Italy's dye output last year are not yet available, but it was probably as large as in 1934 (12,730 metric tons). French output aggregated 11,400 metric tons last year against 10,650 in 1935; Swiss production rose from 6,923 to 7,503 tons, estimates indicate; and Polish production increased from 1,800 to 2,000 metric tons.

Leonard T. Beale, Penn Salt's president, was the subject of a neat and not-too-fulsome biographical sketch in the current issue of *Metal Cleaning & Finishing.*

The General Chemical Co. has moved its Chicago office to the Loop-Center Building, 105 W. Madison St., having leased over 3,000 square feet on the twenty-second floor.

The dried out sludge coming from the new Waukegan, Ill., sewage disposal plant will be sold commercially as fertilizer.

Organize to Steady Naval Stores Marketing

O. T. McIntosh Heads New Cooperative Trading Group—To Raise $100,000 Stabilization Fund — Rosin Research Extended to Turpentine—

That the naval stores market has been in an unsatisfactory state was an open secret confirmed only by the publication of the statistics of the Naval Stores Division of the Bureau of Soils; and the organization of naval stores producers into a self-help marketing group last month came as no great surprise. They formed the Turpentine Farmers Trading Co. at a meeting in Waycross, Ga. and elected the following officers:

President, O. T. McIntosh, Savannah (Southern States Naval Stores Co.); vice presidents, C. M. Jordan, Glenwood; M. C. Stallworth, Mobile, Ala.; J. Edgar Dyal, Baxley; Harley Langdale, Valdosta; acting secretary-treasurer, O. W. Jackson, Savannah. The executive committee is Messrs. McIntosh, Jordan and Dyal. Directors include the president and four vice-presidents, N. E. Joyner, Screven; Charles Gillican, Homerville; L. M. Autrey, Valdosta, and H. M. Wilson, Jacksonville.

Members have agreed to paying $1 for each barrel of turpentine made in 1937, with the minimum at 100 barrels. This represents a single share of stock in the company. The directors will campaign for increased membership. A total of 36,640 units were pledged at the meeting. The goal was set at 100,000 units, which will provide a fund of $100,000 with which to carry out the stabilization program.

Total rosin production in 1936-37 was 2.4 per cent. larger than during 1935-36, due to a sharp increase in production of wood rosin. The drop in production of gum rosin was but 5 per cent. against an expected decline of about 10 per cent. Moreover, the export picture was decidedly unfavorable, with a drop of 17 per cent. below the preceding year, while apparent domestic consumption was up only 3.4 per cent. Total carryover of all classes of rosin on April 1 was 669,231 barrels, as against 765,807 barrels a year before. This records a genuine improvement, although some observers had figured on an even larger reduction.

The statistical position of turpentine, as given in the Government report, confirmed the opinion that no material improvement occurred last year. The carryover on April 1, at 223,364 barrels, was only 7,000 barrels below a year ago. While both domestic consumption and exports showed some increase, this was fully offset by a 10 per cent. expansion in production.

Turpentine Goes Chemurgic

Research to better establish the chemical constituents of turpentine gum and of their possibilities for use in developing new chemical derivatives, was approved by the American Turpentine Farmers Association. The work will be done in Savannah, under direction of Dr. Torsten Hasselstrom. Turpentine as an organic chemical raw material, will give the naval stores industry new outlets and take the replaceable products of the pine tree out of agriculture into chemical manufacturing. The work supplements the research on rosin which the G. & A. Laboratories has conducted for several years for rosin producers. Dr. Hasselstrom is a native of Finland and obtained his doctorate at the Technological Institute of Finland for work in chemistry of the terpenes. From 1929 to 1932 he worked at Columbia University.

Pigment Sales Mark Recovery

Lead and zinc pigments sales in 1936 increased 14 per cent. over 1935 in both value and tonnage, according to the U. S. Bureau of Mines. Compared with 1925-29 averages, however, sales were 39 per cent. lower in value but only 12 per cent. lower in tonnage. Total sales of lead pigments increased 22 per cent. in value and 16 per cent. in quantity whereas zinc pigments increased only 5 per cent. in total value and 13 per cent. in quantity. Producers of lead pigments received nearly $7.00 per ton more for their product in 1936 than in 1935 while zinc pigments brought $6.00 less per ton. Trends in lead pigment quotations during 1936 paralleled that of metallic lead but prices of zinc pigments did not respond to the sharp increase in the zinc quotation. Prices of the zinc oxides, for instance, were increased only 0.25 cent per pound during 1936 whereas the price of metal rose 0.60 cent between January 1 and December 31. The lower sales realization on zinc pigments in 1936 reflected the drastic cut in prices put into effect the latter part of 1935 and the 0.25 cent reduction in lithopone prices in November 1936 was prompted by the 1c cut in titanium dioxide.

Recent years reveal substantial gains in the use of leaded zinc oxide. In 1932, total sales amounted to 105,529 short tons of which white and sublimed lead accounted for 66 per cent., zinc oxide 21 per cent., and leaded zinc oxide only 13 per cent. By 1936 total sales had increased to 194,792 tons, of which the lead pigments supplied 62 per cent., zinc oxide 17 per cent., and leaded zinc oxide 21 per cent. For the same period the average lead content of the latter pigment increased from 23 to 27 per cent. and production nearly trebled.

	1935 Tons	1935 Value	1936 Tons	1936 Value
Basic lead sulfate or sublimed lead:				
White	7,572	$ 727,004	7,531	$ 863,268
Blue	727	71,682	891	102,565
Red lead	28,776	3,492,141	34,896	4,657,322
Orange mineral	252	47,515	248	48,196
Litharge	79,930	8,286,339	86,246	9,966,563
White lead:				
Dry	27,972	3,481,988	34,775	4,367,357
In oil*	68,859	11,957,171	83,632	14,200,617
Zinc oxide	99,697	10,237,953	126,800	11,376,323
Leaded zinc oxide	29,976	2,791,808	40,512	3,508,673
Lithopone	159,486	13,470,274	158,319	12,976,754
Zinc sulfate	7,108	324,966	8,687	388,081

* Weight of white lead only but value of paste.

Fertilizer Tests are Abnormal

Good results obtained this season from fertilizer practices that have often proved disastrous in other years prompts a statement on fertilizer application by Prof. C. B. Sayre, of the N. Y. State Experiment Station at Geneva, and emphasizes the fact that too much reliance cannot be placed on one season's results in fertilizer experiments. This season fine results are obtained in the Station experiments where fertilizers were drilled in with the seed or placed directly under the plants, while in dry seasons, such as have been experienced within recent years, these methods of application have frequently proved disastrous. This year rains occurred immediately after planting each of the crops in the fertilizer placement tests with the result that a high soil moisture content has been maintained on the plats which has, in turn, diluted the concentration of soluble fertilizer salts with the result that fertilizers applied directly with or below the seeds have not been injurious.

The Cumberland Valley Co-operative Ass'n, Shippensburg, Pa., has purchased the Shippensburg Fertilizer Co., which was organized in 1925 by the Central Chemical Co., Hagerstown, and the Baltimore Fertilizer Works in conjunction with William A. Nicklas & Son. It has been controlled in recent years by Davison Chemical Co.

The Valley Fertilizer and Chemical Co. Jackson, Va., has been incorporated for $100,000. George B. Holtzman is president.

Woodruff Fertilizer Works, Orange, Conn., has been incorporated with a capital of $50,000; par $100; paid $1,000.

Du Pont Building Big Canadian Electrolytic Plant

Over $2,000,000 to be Spent at Shawinigan Falls to Serve Expanding Pulp and Rayon Business—Monsanto in Production on Phosphate Electric Furnace—Other New Plants and Expansion—

A third caustic soda and chlorine electrolytic unit is being built in Canada, at Shawinigan Falls, Quebec, by Canadian Industries, Ltd., du Pont affiliate.

More than $2,00,000 will be spent on buildings and equipment, and work on the foundations has already commenced. It is expected to be ready for operation in about a year's time.

The plant will ultimately employ about 60 men with between 200 and 300 engaged during the construction period. The buildings will be of brick and steel with cement foundations and will be mostly single story structures, occupying a land area of about 16 acres, adjoining the company's "Cellophane," hydrogen peroxide and trichlorethylene plants.

Officials state that the new plant is being erected principally to meet the expanding demand for bleached sulfite pulp and rayon pulp which market forecasts show to be in excess of present capacity. The company's two other plants manufacturing caustic soda and chlorine are located at Windsor and Cornwall, Ontario. The new plant when completed will serve the demands of Quebec and the Maritimes and has been located at Shawinigan Falls due to the availability of power and because services already installed for existing plants will provide operating economies for the new unit. Sodium chloride will be shipped by boat from the company's salt beds at Windsor to Three Rivers and from there freighted by rail or road to the plant. The lower freight rates made available by an eastern shipping point will be another factor in economic operation.

The boiler house building for the Harshaw Chemical Co., at 1000 Harvard Ave., Cleveland, will be one story, 38 by 41 feet, and will cost about $8,000.

Contracts have been awarded for construction of another building by the Hilton-Davis Chemical Co., which will be the thirteenth building to be erected on the company's property at Langdon Road and Pennsylvania Railroad, Cincinnati. The company has acquired 53 acres of ground in two purchases so far this year, bringing total acreage to 77 in one plot. Current business, according to A. Brooking Davis, president, runs between 30 and 40 per cent. ahead of last year. In the first half of 1936 the Hilton-Davis Company, predecessor to the present organization, showed net earnings of $78,325.

A $20,000 office and factory building is to be built at 630 Lamar St., Los Angeles, for the North American Paint and Chemical Company. The structure will cover a ground area 80x160 feet.

Equipment valued at $85,000 brings the machinery cost of the Lignite Products Corp., Minot, N. D., plant to approximately $200,000, according to Dr. Raymond Nauth, president.

A branch plant of the Republic Creosoting Co., to cost $100,000 will be established at Lima, Ohio. The plant will be on a tract of more than 100 acres of ground, near the intersection of the D. T. & I. and Nickel Plate railroads.

Old Bakelite plant at Painesville is being renovated for installation of equipment of the Light Alloys Manufacturing Co., recently incorporated for $10,000 under the laws of Ohio by a group of former employees of the Light Alloys Co. whose plant was destroyed by fire last winter.

The Oldbury Electro-Chemical Co. will construct a two-story and basement, brick and steel service and laboratory building at its plant in Buffalo avenue, Niagara Falls, to cost $40,000 or more with equipment.

Consolidated Industries, Inc., will erect a muriatic plant at Fort Worth, Texas. Plans and specifications have been prepared for the addition to the firm's present plant. Oil wells of New Mexico, Texas, Oklahoma and Kansas will supply a market for the acid.

American Enka Corp. is completing a $1,000,000 expansion and improvement program at its Asheville plant with the award of contract for a new warehouse on a low bid of $37,958. Approximately 100,000 square feet of floor space has been added to the textile buildings, a new gymnasium, coal chute, and credit union building provided, together with increasing power facilities and replacing machinery and equipment and general improvements during 1937.

Bids for construction by the American Viscose Corp. of a large plant at Front Royal, Va., have been opened and work will start immediately.

A brick and steel locker building for the Mutual Chemical Co. of America is being built at 1301 Block street, Baltimore, the unit to cost about $10,000.

Plans and specifications for a $10,500 office and cafeteria building have been filed by the R. and H. Chemicals Department of du Pont, at Niagara Falls. The new building will be situated in Chemical Road. It will be of two-story brick and tile construction, 104 feet long and 21 feet wide.

Du Pont has taken options on 200 acres south of Clinton, Iowa, on which will be built a large plant for the manufacture of Cellophane. The first unit of the plant, it is said locally, will be erected in the coming year, and will employ 800 persons.

Tennessee Eastman's plant at Kingsport, Tenn., where an additional building is now under construction, will increase production of acetate staple fiber. This may be interchangeable for acetate yarn production, however, it is stated by officials.

Power was turned on June 21 in the first electric furnace at Monsanto Chemical Co.'s new phosphorus plant at Monsanto, Tenn., and, according to company officials, is operating satisfactorily. The second and third furnaces are scheduled to begin production shortly after July 1. These furnaces, the largest capacity yet constructed in this country, have called for an investment in excess of $3,000,000 in the plant.

International Nickel considerably curtailed its operations at Bayonne, N. J. about 10 years ago but has bought 11 parcels of land adjoining its present holdings. The land, which has a frontage of 378 feet on Linnet St. and 280 feet on Oak St., is for the purpose of enlarging the laboratory and for the erection of administration buildings.

The new plant of the Jefferson Lake Oil Company produced 400 tons of sulfur on its first day's run early last month. It is 13 miles from Freeport, two miles off the highway to Brazoria and represents a $500,000 investment. The 35 wells sunk by the company are on the 50-acre Pabts tract on the edge of the Clemens Dome. The first day's production was the output of three wells. Officers decline to give an estimate of the possible yearly recovery of the wells.

New plant of the Ohio Farmers Grain and Supply Co., at Defiance, O., is completed near the B. & O. railroad tracks in Ottawa ave. Manager Earl Neuman is already in production in order to be ready for the fall season. The plant has a capacity of about 5,000 tons of fertilizer a year divided equally between spring and fall seasons, and will mix 10 or 12 different standard and special formulas.

"Works Councils" Lead C. I. O. in Chemical Plants

Chemical Employes Favor Own Organizations to Outside Unions at Solvay's Hopewell and Calco's Bound Brook Plants—Trouble Still Brewing in Tennessee Phosphate Fields—

C.I.O. progress in organizing workers in the chemical industry has proceeded during June much in the fashion of the frog who tried to get out of the well by jumping up one foot and slipping back two. At the Hopewell plant of the Solvay Process Co., for example, John W. Pollard, C. I. O. organizer, announced the last week in May that he had signed up over 300 workers, a charter was applied for, a formidable set of demands discussed, and the stage was all set for a complete closed shop. The last week in June, however, the Solvay Workers' Council had completed organization with a majority of the plant hourly basis workers as members, and recognition as bargaining agent won officially from the company.

Temporary officers are H. L. Reichardt, chairman; Nelson Carter, vice-chairman, and V. A. Peringer, secretary.

A week's vacation with pay for hourly workers employed continuously since Jan. 1, 1936, has been granted and about a third of the operating force will be affected. In response to the Council's formal notice of organization, J. J. O'Leary, manager of production, wrote:

"The company acknowledges receipt of a sworn statement of the hourly employes of the company at Hopewell, who have signed as members of the Solvay Workers' Council. In accordance with our records, this membership represents in excess of 51 per cent. of the hourly employes on the company's payroll.

"In response to your inquiry, the company recognizes the Solvay Workers' Council as representatives for collective bargaining for such employes as are members of the council.

"Referring to discussion with your board of representatives on June 18, 1937, it is the company's intention to complete promptly a study of wage structures applying to the mechanical and electrical forces. We propose to make such changes as may be indicated as a result of this study within the next two months.

"The company will grant in 1937 vacations of one week with pay to all employes who have been continuously in the company's employ since January 1, 1936.

"The above and other matters raised in the conference of June 18, including method proposed by you for handling grievances, and which are receiving our consideration, will be covered by notices."

At Bound Brook strenuous efforts were made by both the C.I.O. and A.F.L. to organize the Calco workers; but neither gained a strong popular following. However, the organization of the workers' own bargaining agency, the Calcocraft, based upon the so-called "Hamilton plan," originated by E. W. Hamilton of Buffalo, is reported to have won an initial victory.

Production at the Naugatuck Chemical Co. was interrupted by a strike, but work in process was finished by a part-force, and as the wage demands were from the first received with open mind by the management, early amicable adjustment is likely. In the Cyanamid explosives plant at Latrobe, Pa., a local of the C.I.O. received official recognition as the exclusive bargaining agent by the National Labor Relations Board, and the plant of the American Aniline Products Co. at Lock Haven, Pa. was closed by a strike, which is reported to have been settled.

The most serious disturbances of June occurred in the Tennessee phosphate fields, the storm center being Maury, where the miners working for both the Federal and the International Agricultural Chemical Companies struck and completely shut down the operations. Standard Silicate Division of the Diamond Alkali Co. have granted a 5c per hour increase in pay to their operating force at Ottawa, Ill., and at Granite City in the same state, a closed shop agreement was signed with the U. S. Starch Refineries and an A. F. L. affiliate after nearly a month's negotiations.

Chile Nitrate Production Higher

"The nitrate industry continued to operate normally in 1936," said the President of Chile in his address at the recent opening of Congress. "Credit should be given to the reforms and assistance provided by law in 1934. The Nitrate Sales Corporation, despite rising costs of production, due to increases in wages and in the price of materials, has met competition from the synthetic producers. Nitrate is one of the few materials which have not materially increased in price since 1935. Relations between the Chilean and the synthetic producers are maintained in an atmosphere of good-will. Trade restrictions in many countries are such that the volume of sales is not likely to reach the levels attained prior to the world depression; nevertheless, sales in the nitrate year 1934-1935 were 24.7 per cent. greater than in 1933-34 and, in 1935-1936, were 31.7 higher."

Central Chemical Corp. of Virginia, Harrisonburg, Va., has been formed with maximum capital $100,000, H. A. Spangler, president, Harrisonburg, Va.

Dr. E. W. K. Schwarz With Arkansas

Dr. E. W. K. Schwarz has joined Arkansas Co., as Technical Director and adviser to the sales force. He was formerly technical editor of *Rayon Textile Monthly* and co-author with H. R. Mauersberger of the "Rayon and Synthetic Yarn Handbook." His technical experience began with Badische which he left in 1923 to come to the United States. Here he became chemist with Kuttroff & Pickhardt and later with the General Dyestuff Corporation. Dr. Schwarz' Ph.D. degree is from the University of Erlangen. He was a pupil of Otto Fischer and Wilhelm Ostwald, founder of the famous color theory. He followed his studies with scientific investigations at the Textile Research Institute of Muenchen-Gladbach.

"Beckacite" Infringes "Bakelite"

Bakelite Corp. won all nine appeals brought to the United States Court of Customs and Patent Appeals by Beck, Koller & Co., Detroit, and involving trade-mark oppositions or cancellation proceedings in connection with the latter's application to register the words, "Beckacite," "Beck-O-Lac," and "Beckolloid," for use on various synthetic resin products. In three of the cases the disputed mark was a design having a trefoil border and using the initials of the respective companies.

The court in each case sustained the Commissioner of Patents, who had found that Beck, Koller & Co. was not entitled to the registrations sought. The court agreed with the commissioner that, while the goods of the two companies were not identical, they were of the same descriptive properties and in general of a competitive nature.

Field Work for Asphalt

In Dallas, at 613 Southwestern Life Building, a new field office of the Asphalt Institute has been opened from which work will be extended to Texas, Arkansas and Oklahoma in engineering, research and promotional activities for the asphalt industry. D. D. Williamson, formerly head of the Texas State Highway Laboratories, is in charge of the Dallas office. The asphalt industry is particularly interested in the development of the Southwestern market and within the last few months the following companies have been elected to membership in the institute: Anderson-Prichard Oil Corporation and Col-Tex Refining Co. of Oklahoma City; the Cosco Oil Co. and Cosden Oil Corporation of Fort Worth, and the Magnolia Petroleum Co. of Dallas.

Alkali Prices Unchanged for Last Half

Sulfuric, Muriatic, Carboy Schedule Advanced—Epsom Salt 10c Higher—June Shipments in Slightly Better Volume—Borax $2 a Ton Higher—

While a number of important price revisions were placed in effect July 1st fewer changes were made than were anticipated. Perhaps of greatest importance was the continuance of the existing alkali schedule. In some quarters talk was heard of the possibility of higher prices, but these failed to materialize and ash, caustic, and bicarb users will remain on the present basis.

Acid makers, however, did place in effect upward revisions in carboy schedules for battery, sulfuric, and muriatic acids and a decline of 5c in the 10 to 25 schedule for nitric. In addition prices for acetic are much firmer, although no general revision in the published schedule was announced.

Although labor troubles were, if anything, rather worse than better, the demand for industrial chemicals improved slightly in June over the low point reached in May, indicating that consumers' accumulation of stocks were dwindling and that they were being forced to replenish.

Curtailment of operations to a slight degree was reported in the automotive industry as several companies prepared for next year's models and steel activity dropped sharply to 75% as a result of the bitter labor strife staged at the plants of the independent producers, but a high rate of activity was continued in the rubber, paper, and ceramics fields.

Additional price changes included a 26c advance in cobalt oxide, an 8c rise on cobalt acetate, 13c on the carbonate, 18c on both the chloride and hydrate, an 8c advance on the sulfate, a ½c increase in sulfur chloride raising the carlot quotation in drums to 3c per lb. Sodium silicofluoride was weak and a ½c decline took place in the first week of the month. A new schedule on methyl chloride was introduced. In 60, 90 or 130-lb. containers, spot or contract, for service men and consumers in quantities of 60 to 499 lbs. the price is now 40c; in quantities 500 lbs. or more the price is 36c; in multitank cars the new price is 35c. The schedule for jobbers and refrigerator manufacturers is as follows: 60, 90, and 130-lb. cylinders, 60 to 499 lbs., 36c per lb.; 500 pounds and up, 32c; multi-tank cars, 31c. An additional 10c per lb. is charged for the 20-lb. cylinders above the prices given above.

Important Price Changes

ADVANCED	June 30	May 31
Acid, battery, carboys	$ 1.45	$ 1.35
Muriatic, carboys, 18°	1.50	1.35
20°	1.75	1.45
22°	2.25	1.95
Borax	42.00	40.00
Cobalt oxide, black	1.67	1.41
sulfate	.59	.51
Epsom salt, tech.	1.90	1.80
Sodium stannate	.36½	.36
Tin, metal	.57¼	.55
Tin, tetrachloride	.29	.28
DECLINED		
Sodium silicofluoride	$0.05¾	$0.06

A 25c rise was reported on both ammonia and potash alums. The new schedules are based on $3 to $3.25 at the works for granular ammonia alum; lump, $3.25 to $3.50; powdered, $3.40 to $3.65. Granular potash is quoted at $3.25 to $3.50; lump, $3.50 to $3.75; powdered, $3.65 to $3.95. A ¼c advance was reported in the tank car price for zinc chloride solution. While no change was made in the trisodium phosphate schedule prices are now much firmer.

Manufacturers generally are now of the opinion that summer business may be rather heavy. Despite difficulties, business activity is at a very high point and the stocks of raw materials which were taken in early in the spring when commodity prices were soaring are down now to a more normal state. Further, with the period of price adjustments out of the way purchasing agents are in a more settled frame of mind as to what to expect for the remainder of '37. It appears at the moment at least that improvement in strike conditions which are hampering many divisions of industry is quite likely. Public sentiment and even many federal and state officials appear to be aroused over the unfavorable situation. The pendulum appears now to be swinging in the opposite direction.

Heavy Chemicals

Schedules for potash and soda prussiates, and also bichromates for the balance of the year are unaltered. Heavy arrivals of egg products forced 2c reductions in egg albumen and egg yolk. A good demand for corn derivatives was reported and the price structure is firm. No changes of importance were reported in the markets for sulfonated oils. The market for dyes was seasonally slow.

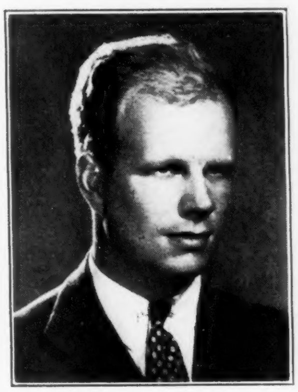
Four Alkali Salesmen Move to New Posts

Mathieson Alkali has promoted Robert M. Mannheim to New England District Manager with headquarters in the Hospital Trust Building, Providence. He has been with Mathieson for the past six years covering the northern New Jersey territory.

James R. Harrington, who has been covering the New York metropolitan area, will take over Mr. Mannheim's old territory in northern New Jersey, while Donald G. Ross will replace Mr. Harrington in the New York area. Mr. Harrington is a graduate of Washington University, St. Louis, and was formerly with Titanium Division of National Lead Company, while Mr. Ross received his training at Princeton and has been until recently a member of Mathieson's New York office staff.

J. F. Dockum has been appointed Columbia Alkali's Sales Manager for New England, with offices at 300 Babcock St., Boston. He is a native of New England, is a graduate of the University of New Hampshire, and has been with Columbia at Barberton, Ohio.

J. F. Dockum



Donald G. Ross

R. M. Mannheim

J. R. Harrington

Fine Chemicals

Douglas W. Coutlee, Merck, was re-elected president of the Pharmaceutical Advertising Directors' Club at the annual dinner meeting, June 24. The association also re-elected the following: Vice-president, A. Douglas Brewer, of Ciba, treasurer, Edward B. Austin, Thomas Leeming & Co., and secretary, E. Walton Bobst, of Hoffman-La Roche.

Roger W. Richardson of the technical staff of the Standard Oil Co. of Louisiana at Baton Rouge is joining the Esso Laboratories of the Standard Oil Development Co. at Elizabeth, N. J., to head work on motor oils July 1, 1937.

Benedict Van Voorhis of du Pont has been elected president of the Purchasing Agents' Association of New York for the ensuing year.

Bradley Dewey, president of the Dewey & Almy Chemical Co., for the past five years a term member on the Corporation of the Massachusetts Institute of Technology, has been elected a life member. He is a graduate of Harvard and of M. I. T. in the class of 1909. Mr. Dewey was president of the Technology Alumni Association in 1931-32 and a member of the Alumni Council since 1921.

E. H. Himrod of du Pont, who has just returned from Venezuela, recently discussed the market for American goods in that country before the Export Managers Club of New York.

World production of chlorine is estimated by *Die Chemische Industrie* to be between 600,000 and 700,000 tons a year. Of this output more than 500,000 tons is liquid chlorine. Production in 1929 is estimated as having been about 400,000 tons of which about 300,000 tons were liquid.

Ozark to Make Muriatic

Ozark Chemical Co., Tulsa, Okla., will manufacture hydrochloric acid and sodium phosphate, according to Park Kelley, general manager, who said the first unit will have capacity of sixty tons per day. General use of muriatic acid for treatment of oil wells prompts this expansion and additional units will be installed as rapidly as the demand warrants.

Established in 1925, the company constructed five units for sulfuric acid manufacture up to 1930. Daily production of 150 to 200 tons was maintained during the depression period.

Tartaric Acid Again Advanced 1¢

Other Tartars Raised—Argols Scarce—U. S. P. Zinc Oxide Now 9½c—C. P. Acids Higher—Glycerine Stabilizes at 2½c.

The tartars were again the outstanding news in the fine chemical field. A further advance of 1c in both tartaric and cream of tartar was announced and a ½c increase was reported for Rochelle and Seidlitz mixture. The steady rise in tartars is the result of rising prices for argols abroad. U.S.P. zinc oxide was raised ½c to a 9½c basis. A 1c rise in ethyl alcohol was reported. Because of increased production and labor costs borax was "upped" $2 per ton but no change was made in boric. U.S.P. Epsom salt is now 10c per 100 lbs. higher.

Other increases included a 17c increase in cadmium bromide, 10c increase for calcium bromide, and 7c increase for strontium bromide. On the decline side hydroquinone was off 20c and strontium iodide 10c. The C.P. acids, muriatic, nitric and sulfuric were advanced 1c to dealers and 1½c to consumers.

The market for mercury remains extremely firm around the $97.00 per flask level. The future movement in this item depends to a great extent on what happens in Spain. Further successes on the part of Franco might tend to open up the possibility of heavier supplies for export.

Glycerine looks firmer at the moment and the belief is strengthening that the current levels will be maintained for some time. The surplus stocks which were floating about are now out of the picture and speculation is definitely over.

June volume of fine chemicals was said to have been satisfactory The call for seasonal items is particularly good. A specially good demand is noted for acetanilide which is the basis for the manufacture of sulfanilamide, the comparatively new weapon against streptococcus infections.

Important Price Changes

	June 30	May 31
ADVANCED		
Acid tartaric	$0.24¾	$0.23¾
Cadmium bromide	1.61	1.44
Calcium bromide	.70	.60
Cream of tartar	.18¾	.17¾
Epsom salt, U.S.P., bbls.	2.10	2.00
Bags	2.00	1.90
Rochelle salt	.15	.14½
Strontium bromide	.57	.50
Zinc oxide, U.S.P.	.09½	.09
DECLINED		
Benzaldehyde, U.S.P., X	$0.85	$1.25
Hydroquinone	.90	1.10
Sodium Mandelate	4.25	5.25
Strontium iodide	2.70	2.80

Japan Expands Nitric Acid

The Showa Fertilizer Co. is building a plant for the production of nitric acid. The original plan called for completion of the project in January of 1937, but various delays have occurred and it is expected that actually marketing will not start until this month.

The company expects to produce 30 metric tons per day and is expected to upset the balance between supply and demand. The Ube Chisso Kogyo K. K. (Ube Nitrogen Industry Co., Ltd.) is expected to produce nitric acid at the rate of 10 metric tons per day.

Thompson - Hayward Chemical Co.'s Chicago offices are now at 1838 W. 33rd St. Telephone Lafayette 800.

Fine Chemical Items

Carl M. Anderson, new assistant secretary of Merck, graduated with honors from Minnesota in 1927 and from the law school of that university in 1930. From 1930 to 1934 he was associated with the New York firm of Root, Clark, Buckner and Ballantine. Since that time he has been with Merck & Co. as legal counsel. He is Chairman of the Legislative Committees of both the Drug, Chemical and Allied Trades Section, New York Board of Trade, and American Drug Manufacturers' Ass'n; and of the Advisory Board to the N. Y. State Commission Narcotic Control.

Although no longer dependent wholly upon imports, the United States is reducing progressively its output of iodine. Sales of American-produced iodine in 1936 reported by the Bureau of Mines as 233,925 pounds valued at $212,636, a decrease of 6 per cent. in quantity and 14 per cent. in value compared with 1935 sales and not much more than half as great as during the peak year 1933 when sales rose to 401,525 pounds valued at $669,289.

In 1936 exports of derris from British Malaya were 599 long tons, valued at $525,265 Straits Settlements currency, according to provisional estimates. This compares with 567 tons in 1935, 481 tons in 1934, 570 tons in 1933, and 167 tons in 1932.

Dr. Charles L. Mantell has resigned from the faculty of Pratt Institute to devote more time as director of research of the American Gum Importers Association, this city, and for the Nederlandsch-Indische Vereenging voor den Handel in Gommen, an association of gum producers in the Dutch East Indies. Dr. Mantell will also engage in private consulting work. He has been with Pratt Institute since 1922 in charge of the chemical engineering department.

Coal-Tar Chemicals

Best du Pont Safety Record

Du Pont reports that the company's safety record in major injuries for 1936 is the lowest in its history. The number of employes in 1936 was 53,000, an increase of about 15 per cent. since the end of 1935. The total major injuries, the company states, was 170. The frequency rate was 1.9 major injuries per 1,000,000 hours of work. The fatality rate per 1,000,000 hours worked was 0.067. The severity rate was 0.83 days lost because of major injuries per 1,000 hours.

There were 92 plants, laboratories and construction operations of the company located in 27 states. Some of these have outstanding safety records. The Old Hickory Rayon plant, Nashville, Tenn., as of March 21, this year established the best no-injury record in American industry, according to the records of the National Safety Council, and won for the second time the company's board of directors' prize. It operated 525 days with a total of 11,361,846 man hours without experiencing a major injury.

Germany Makes More Rosin

Liquid rosin is obtained as a by-product from sulfate pulp by the Natron Zellstoff und Papierfabriken A. G., Berlin, operating two plants, Krappitz and Altdamm, with a joint production capacity of 62,000 tons a year. However, since announcement of the four-year plan construction of one more sulfate plant has been commenced by the Zellstoffbabrik Waldhof, with an annual production capacity of 30,000 tons, and more new establishments are to follow.

The annual output of liquid rosin in Germany is about 1,000 tons. In addition, considerable quantities are imported from Sweden and Finland. During the past four years these imports have grown. In 1936 German imports totaled 11,382 metric tons as compared with 4,697 metric tons in 1935. For 1936 Sweden sold practically its whole supply of liquid rosin to Germany, occasioning a shortage of the product in the country of origin, the total amount of imports from Sweden being 8,159 metric tons and the balance coming from Finland. Reason for the increase in imports is the discovery of a method for recovering pure fatty acids (toll oil) from the rosin and effecting a synthesis of a drying oil by esterizing with glycerin. The process is patented as DRP 626,491, controlled by the E. Dorken A. G., of Herdecke, Ruhr.

Acute Shortage of Many Coal-Tar Chemicals Reported

Crude Naphthalene Lower—Creosote Oil Up ½c—Shingle Oil Stain Advanced 1c—Acid Oil Schedule Revised—

Activity in the market for coal-tar chemicals is the particularly bright spot in the chemical picture. Shipments are heavy and on many important items it is practically impossible to obtain spot goods. Contract buyers have been ordering out heavier quantities as a precautionary measure fearing a shortage should the steel strike in the independent plants continue indefinitely and possibly spread to the U. S. Steel mills in spite of the settlement of the latter with the C.I.O. Purchasing agents are fearful that Mr. Lewis' organization may follow the example shown in the automotive field where despite agreements with General Motors and other producers strikes have been called on the slightest pretext.

The one outstanding price change of the month was further weakening in the market for crude naphthalene. Several contributing reasons are given including much larger U. S. production, heavier stocks abroad available for export, and the end of the season for refining operations. In striking contrast is the firmest market in years for refined.

There is an acute shortage of coal-tar solvents and even some decline in automotive production has failed to improve the situation. The shortage in xylol is particularly serious. Users of cresylic are finding it increasingly difficult to obtain supplies and in many quarters the opinion is freely expressed that the worst is yet to come; that it will not be so much a question of price but of obtaining supplies. Of course the producers are taking good care of contract and regular customers but the spot buyer is experiencing difficulty.

The extent of improvement in the consumption is even more forcibly driven home when '36 production figures of the Tariff Commission are studied. The following increases are reported: intermediates, 16.7%; phthalic anhydride, 33%; phenol, 12%; crude naphthalene, 88%; refined naphthalene, 13%; aniline, 18%; and nitrobenzol, 10%. It is a fair assumption also that production in the first half of the current year has been greater than the average for '36.

The remaining price changes last month of importance included ½c advance in creosote oil, a 25c per bbl. rise in crude coal-tar, a 1c per gal. increase in shingle stain oil, a 1½c advance in 15% tar acid oil, and 2c increase in the 25% grade.

Tar recovery in May was 59,256,342 gals., against 57,699,552 in April and 49,862,664 in May a year ago, according to the U. S. Bureau of Mines. Total for the first five months was 287,090,703 gals., against 224,748,232 in the same period a year ago. Benzol production was 10,435,000 gals. in May, against 10,328,000 in April and 9,289,000 in May a year ago. Ammonia sulfate, or its equivalent, was recovered in May to the extent of 71,823 tons, against 69,820 in April and 59,229 in May a year ago. Total for the first 5 months was 346,794 tons, against 268,209 in the same period a year ago. Light oil production was 18,648,143 gals. in May, against 18,116,996 in April and 15,683,484 in May a year ago. Total for the first 5 months was 90,268,268 gals. against 70,690,875 in the same period a year ago.

Coal-Tar News Notes

Carnegie Illinois Steel Corp., a subsidiary of U. S. Steel, has awarded a contract to Semet-Solvay Engineering Corp., for what will be the world's largest benzol refining plant to be located at Clairton, Pa.

The large two-story building at 301 E. 7th St., Charlotte, N. C., has been leased by the American Aniline Products Co.'s southern office in order to have more floor space.

A new plant for processing tar is to be built for the Savannah Gas Co. by Koppers.

William B. Hale has been honored with an LL.D. degree from his alma mater, Miami University.

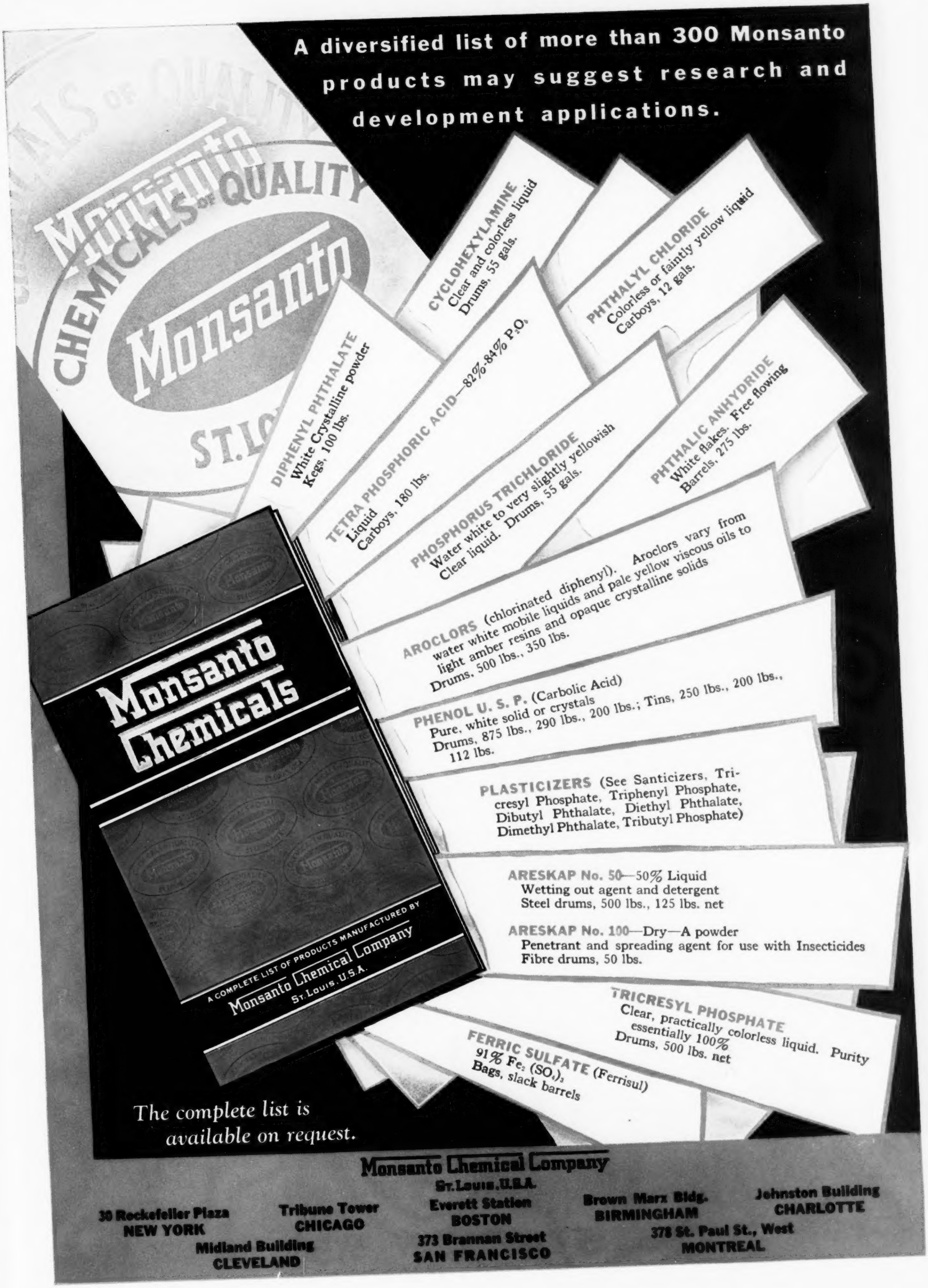
Charles B. Murray of the consulting firm of Crowell & Murray, Cleveland, received the honorary degree of Doctor of Engineering from Worcester Polytechnic Institute.

Benjamin T. Connor, one of the best known plastics men in the country has been elected vice-president of Colt's where for the past 12 years he has had charge of the plastics department.

Francis P. Garvan has recently published a series of eight articles on the reciprocal trade treaties widely syndicated to daily newspapers throughout the country by Nana, Inc.

Williams Haynes, publisher of CHEMICAL INDUSTRIES, recently spoke to the Litchfield (Conn.) Forum on the everyday uses of new synthetic chemical products.

Dr. Charles M. A. Stine, du Pont vice-president, has been elected a life trustee of the University of Delaware.

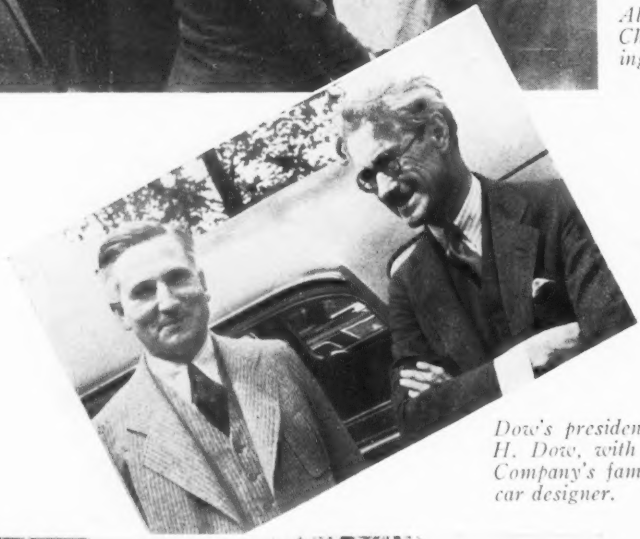

A diversified list of more than 300 Monsanto products may suggest research and development applications.
Monsanto CHEMICALS OF QUALITY Monsanto ST. LO
CYCLOHEXYLAMINE Clear and colorless liquid Drums, 55 gals.
PHTHALYL CHLORIDE Colorless or faintly yellow liquid Carboys, 12 gals.
DIPHENYL PHTHALATE White Crystalline powder Kegs, 100 lbs.
TETRA PHOSPHORIC ACID—82%-84% P_2O_5 Liquid Carboys, 180 lbs.
PHOSPHORUS TRICHLORIDE Water white to very slightly yellowish Clear liquid. Drums, 55 gals.
PHTHALIC ANHYDRIDE White flakes. Free flowing Barrels, 275 lbs.
AROCLORS (chlorinated diphenyl). Aroclors vary from water white mobile liquids and pale yellow viscous oils to light amber resins and opaque crystalline solids Drums, 500 lbs., 350 lbs.
PHENOL U. S. P. (Carbolic Acid) Pure, white solid or crystals Drums, 875 lbs., 290 lbs., 200 lbs.; Tins, 250 lbs., 200 lbs., 112 lbs.
PLASTICIZERS (See Santicizers, Tricresyl Phosphate, Triphenyl Phosphate, Dibutyl Phthalate, Diethyl Phthalate, Dimethyl Phthalate, Tributyl Phosphate)
ARESKAP No. 50—50% Liquid Wetting out agent and detergent Steel drums, 500 lbs., 125 lbs. net
ARESKAP No. 100—Dry—A powder Penetrant and spreading agent for use with Insecticides Fibre drums, 50 lbs.
TRICRESYL PHOSPHATE Clear, practically colorless liquid. Purity essentially 100% Drums, 500 lbs. net
FERRIC SULFATE (Ferrisul) 91% $Fe_2(SO_4)_3$ Bags, slack barrels
Monsanto Chemicals
A COMPLETE LIST OF PRODUCTS MANUFACTURED BY Monsanto Chemical Company St. Louis, U.S.A.
The complete list is available on request.
Monsanto Chemical Company
St. Louis, U.S.A.
30 Rockefeller Plaza NEW YORK
Tribune Tower CHICAGO
Everett Station BOSTON
Brown Marx Bldg. BIRMINGHAM
Johnston Building CHARLOTTE
Midland Building CLEVELAND
373 Brannan Street SAN FRANCISCO
378 St. Paul St., West MONTREAL

CHEMICAL

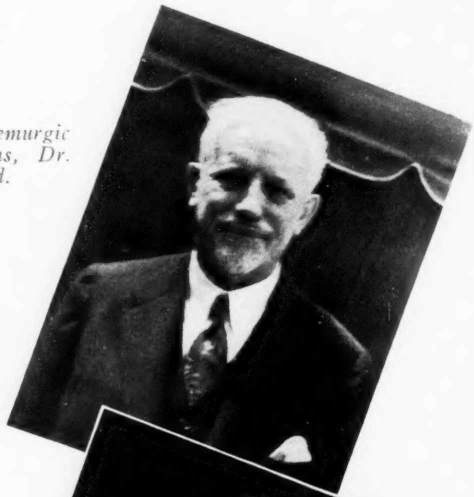
The Photographic Record

At Dearborn
May 25-27, 1937

All aboard for the Farm Chemurgic Council meeting at the Statler.



Dow's president, Willard H. Dow, with the Ford Company's famous motor car designer.



Chief of the Chemurgic research programs, Dr. Harry E. Barnard.

C. E. MacQuigg, who this month leaves the industry to become Dean of Engineering at Ohio State, flanked on the left by ex-Dean E. A. Hitchcock and on the right, John F. Cunningham, Dean of Agriculture.

"Prestolog," pressed sawdust firewood, displayed by its inventor, Dr. Harry Miller.

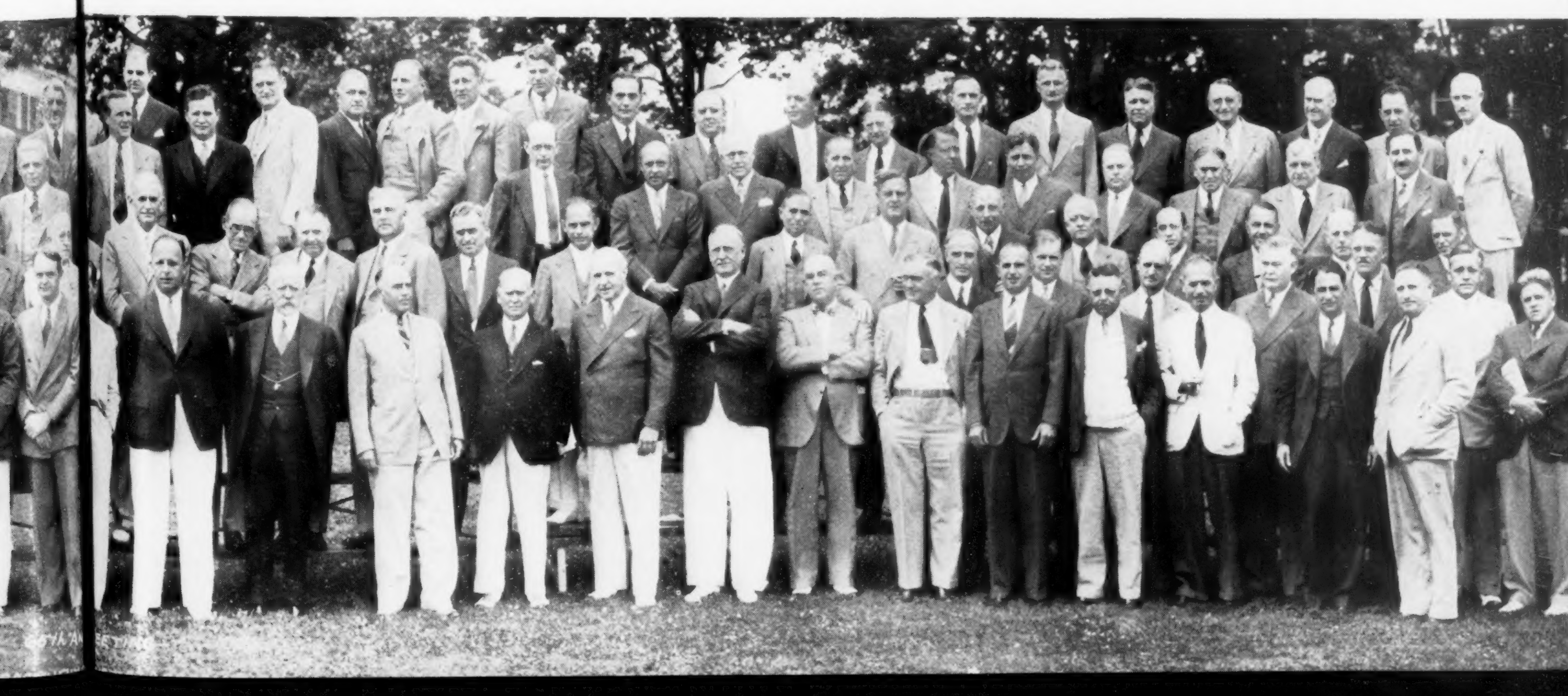
NEWS REEL

of Our Chemical Activities

At "Seaview"
June 3-5th, 1937

In the corner, the self-styled reception committee awaits new arrivals on the Club steps. Center, two gentlemen from the South, Colonel J. J. Riley and Charles H. Stone; and below, two important Executive Committeemen, William B. Bell and Leonard T. Beale.

Above, J. B. Frorer, Atlas Powder, and E. W. Furst, of du Pont's Grasselli, with Dr. Roger N. Wallach, president of Sylvania.



Solvents and Plasticizers

New Rubbing Alcohol Formula

Treasury Dept. has ordered a change in denaturants for rubbing alcohol, to be effective Sept. 1. The change affects formula No. 23-G, which calls for the addition of 10 gallons of acetone and 4¼ pounds of sucrose octa-acetate to 100 gallons of alcohol. The new formula demands the addition of 3½ gallons of methylproplyketone and one-half gallon of methylisobutylketone to 100 gallons. Furthermore, the blender must add one-half avoirdupois ounce of sucrose octa-acetate per one gallon of finished product in the process of manufacturing rubbing alcohol, instead of the choice of additional materials now permitted. U. S. Public Health Service has tested the new formula on both animals and human beings and reports its action on the skin similar to that of pure alcohol.

The U. S. Industrial Alcohol Co. brought suit in United States District Court at New York to obtain a refund of $625,113.97 plus interest for taxes paid the Federal government in 1927. The tax was paid then as an additional tax for the year 1918 upon the demand of Collector of Internal Revenue in the 2d New York District.

Proposal for obtaining greater profits from sisal by extracting alcohol from the stalks of the plants is being developed by the Economy Ministry of the Republic of Mexico.

Chartiers Oil Co. will construct a natural gas purification plant to supply the Carbide and Carbon Chemicals Corp. The plant will be located on Patrick Creek, near Kenova, W. Va. Estimated cost is $50,000. Officials said the product will be piped to the Charleston chemical works.

U. S. Treasury Department on June 24 issued a decision permitting the sale of ethyl acetate through dealers in limited quantities. Heretofore this solvent could be sold only by producer to consumer. The new regulation permits drug stores, paint dealers, and other retailers to stock limited quantities each month for sale in small quantities.

Du Pont has begun a newspaper campaign in the Middle West for Zerone anti-freeze as a "year-round radiator conditioning, " particularly as a rust inhibitor.

Alcohol Advanced 1¢ For Third Quarter

Tank Car Prices for Petroleum Solvents Steady—Tankwagon Schedules Revised—Denaturing Grade Methanol 2c Lower—

Third quarter prices for alcohol are in all cases 1c higher. On the new basis C.D. in tanks is 29c; drums in carlots, 35c; 20 drums, 37c; smaller quantities, 39c. The tank car price for S.D. 1 is 27c; drums in carlots, 33c; 19 drums, 35c; and smaller quantities, 38c. Special solvent in tanks is 28c; drums in carlots, 34c; 20 drums, 36c; smaller quantities, 39c. These prices are works' quotations. West of the Rockies completely denatured is 3c a gal. above the prices given above. Ethyl alcohol was also increased 1c and tanks are now $4.06 and drums in carlots, $4.12. Ethyl alcohol production in May totalled 16,937,680 proof gals., as compared with 14,668,136 in May '36.

Tankcar prices of petroleum solvents remained unchanged but a number of revisions in tankwagon prices were made. Petroleum thinner in the Bridgeport, Trenton, and Metropolitan New York areas was revised upwards in the final week and in the middle of the month a general revision in the mid-west section was reported.

Denaturing grade of methanol as a result of competition was lowered 2c and is now quoted in tanks at 38c. Methanol production in May totalled 522,961 gals. of crude and 2,353,497 gals. of synthetic, as compared with 531,727 and 2,138,895 gals. respectively in April and 427,079 and 1,754,998 gals. respectively in May of last year.

The demand for solvents was particularly good last month. While a few of the automotive producers are scaling down production in preparation for the introduction of the '38 models, the volume of production has held up well, with the result that lacquer manufacturers are busy and so are the tire manufacturers in the Akron and other producing areas.

Important Price Changes

	June 30	May 31
ADVANCED		
Alcohol, C. D. drums	$0.35	$0.34
S. D. I. drums	.33	.32
Tanks	.27	.26
Special solvent drums	.34	.33
Tanks	.28	.27
Ethyl	4.06	4.05
Octane, Group 3	.10½	.08½
DECLINED		
Heptane 77-115, Group 3	$0.08½	$0.09½
Methanol, denat. drums	.44	.46
Tanks	.38	.40
Pentane, nor., Group 3	.08½	.09½
Petroleum ether 30-60 drs., Group 3	.14	.15

New Shell Lab at Wood River

The new research laboratory building at Shell's Wood River refinery will be a great show place, designed to provide one of the most modern laboratories in all the petroleum industry. It will serve as a center for research and development activities in the area served by Shell Petroleum Corp. The new building will provide somewhat more than double the present space devoted to research on the manufacture and application of petroleum products at Wood River.

Design of the building has been carried out not only with a view to providing efficient laboratory accommodations, but also to present an exterior which compares favorably in appearance with new structures of this type in other industries and educational centers. The exterior design of the building closely resembles that of the recently completed Shell geophysical laboratory at Houston, Tex. Equipment will take full advantage of recent developments in the physical and chemical sciences. In particular, the motor laboratory will be provided with very complete equipment for studying the performance of both fuels and lubricants under the conditions existing in service and under much more severe conditions, if desired.

Mifflin Charged with Diversion

The Mifflin Chemical Corporation, large producers of rubbing alcohol, was indicted by the federal grand jury in Philadelphia in connection with alcohol diversion.

The indictment, made public June 17, by Judge George A. Welsh, in the U. S. District Court, Philadelphia, charged the company with conspiring with a bootleg gang to convert rubbing alcohol into whiskey and other beverages, thus defrauding the U. S. Treasury out of $600,000 in revenue.

This gang maintained warehouses at Hammonton, Chester, Pa., and in Philadelphia, according to Edward C. Dougherty, chief of the U. S. Alcohol Tax Unit, Philadelphia.

David Muchnick, head salesman for Mifflin, and three smaller corporations are accused of being "bootleg fronts." These corporations are the P. and P. Transportation Co., Quaker City Jobbing House, and the Three-Star Chemical Co., all of Eighteenth st., Philadelphia.

The federal permit of the Mifflin firm was revoked by the government last Fall. The company appealed to the U. S. District Court and Judge Oliver B. Dickinson restored it and granted a new one for 1937. He said he knew nothing of the illegal diversion. The Internal Revenue Bureau has appealed Judge Dickinson's decision to the Circuit Court of Appeals. Testimony was taken two weeks ago and the decision is pending.

Nitrate of Soda Quoted $1 Per Ton Higher

Suppliers Only Offer Material Through October—Firmer Market at Chicago for Bone Materials—May Tag Sales Slightly Under Last Year's Figure—Exports Increase in April—

Agricultural Chemicals

The most important price announcement of the month in the raw fertilizer markets was the $1 advance in bulk nitrate of soda with suppliers only offering material at this level through October. Quotations on bagged goods were also increased $1 per ton but only for July delivery. On the above basis bulk is now selling at $26.50; 200-lb. bags at $27.80; 100-lb. bags at $28.50 per ton.

Domestic raw bone was advanced $1 early last month and imported 50c per ton, but the latter was down the same amount at the close of the month. Bone meal was $2 higher at Chicago and a similar increase was reported for steamed, while imported was up 50c. There were two 50c declines and a $2.50 per ton decline in Jap sardine meal, bringing current quotations to $47 per ton c.i.f. for prompt shipment. At such a figure domestic menhaden producers appear to be out of line at $4 and 10c, the present nominal market. Organic ammoniates continued weak and prices generally were lower.

Reversing the upward trend which had been so pronounced in recent months, aggregate fertilizer tax tag sales in 17 states were slightly smaller in May than in May, 1936. In view of the unusually large spring season and of the fact that May sales ordinarily account for only about 6% of the year's total this slight decline is without significance. Increases over last year were recorded in 9 of the states and declines in 8.

Sales in the July-May period were larger in every case this year than last with the increase in total sales amounting to 29%. With the exception of Oklahoma, where the tonnage is relatively small, the increases over last year in every State have been quite sizeable. There has been a particularly sharp rise in farm income in the South Central region this year, with farmers' cash receipts in this area in the January-April period amounting to 56% more than in the corresponding period of last year. This helps to explain the large increases in tag sales in such states as Arkansas and Louisiana. With the outlook favorable for a continued high level of farm income there should be a good fall tonnage this year.

Exports of fertilizer and fertilizer materials in April were somewhat above April of last year, reversing the downward trend which had prevailed in recent months. Totaling 137,607 short tons with a stated valuation of $1,355,694, they were the largest reported for any month since last November. Nitrogenous materials were exported in smaller volume this year than last but there were increases in rock, superphosphate, and potash.

Important Price Changes

	June 30	May 31
ADVANCED		
Blood, dried, imported	$ 3.65	$ 3.60
Sodium nitrate, bulk	26.50	25.50
DECLINED		
Nitrogenous material:		
Midwest	$ 3.15	$ 3.25
Sardine meal, Jap.	49.50	50.00
Tankage, N. Y., ground	3.50	3.60
Chicago	3.25	3.40

Total exports in the first 10 months of the current fiscal year, from July through April, were 26% less than in the corresponding period of last year but 10% larger than 2 years ago. There has been a particularly sharp drop in exports of nitrogenous materials, with a decline of a hundred thousand tons in shipments of ammonium sulfate alone. The only important increase was in superphosphate.

Totaling 283,366 tons valued at $5,693,416, imports in April exceeded April of last year by 34% in volume and 41% in value. Increase was due mainly to larger imports of sodium nitrate. Smaller gains were shown in organics, cyanamid, calcium nitrate, and ammonium phosphates, while there was a sharp decline in ammonium sulfate. Superphosphate imports continued to rise, with receipts during the month including a shipment from the Netherlands. Muriate of potash was imported in smaller volume this year than last but this was more than offset by larger imports of 20% kainite, manure salts, and sulfate.

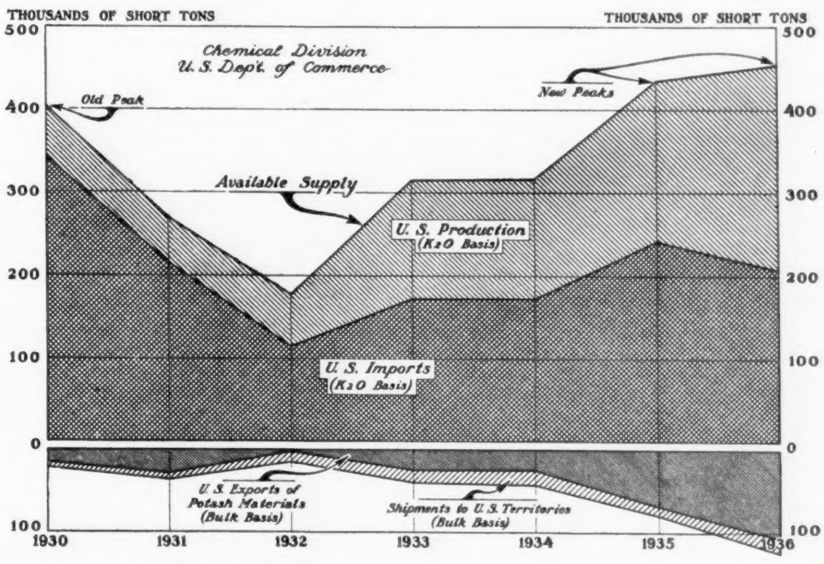
Nitrogenous materials, phosphates, and potash were all brought in in much larger volume in the July-April period than a year earlier, reflecting the greatly improved domestic demand for fertilizer this year.

Operation of the Davidson-Pick Fertilizers, Inc., New Orleans, will in the future be under the name of the Davison Chemical Corp.

Domestic Potash Gains

Potash sold within the continental United States, Canada, Cuba, Puerto Rico, and Hawaii during the first quarter (January-March, inclusive) of 1937 amounted to 131,388 tons of actual K_2O (equivalent to 266,354 tons of potash salts), of which total were 184,996 tons muriate, 18,634 tons manure salts, 20,801 tons sulfate, 39,352 tons Kainit, and 2,391 tons sulfate of potash-magnesia. These figures from the Potash Institute include salts of domestic and foreign origin, exclusive of importations of potassium nitrate.

The above compares to deliveries of 66,129 tons of K_2O during the corresponding period in 1936 (equivalent to 138,162 tons of salts), consisting of 83,955 tons of muriate, 21,038 tons manure salts, 10,892 tons of sulfate, 1,041 tons of sulfate potash-magnesia, and 20,736 tons kainit. This represents an increase of 91.7 per cent. in gross tonnage of K_2O. The greatest tonnage increase was registered in the Southern states. Shipments to the Southern, Northeastern and Mid-Atlantic states, Mid-western states, and the West Coast increased 124 per cent., 68.2 per cent., 121.9 per cent., 181 per cent., respectively.



Pigments and Fillers

Lithopone, Titanium Pigments Higher For 3rd Quarter

Italian Siennas and Spanish Oxides Advanced—Important Phthalates Quoted 1c Higher—Ester Gum Reduced—Paint Sales at Record Levels—

Spain Losing Pyrites Trade

Spain's position as a supplier of pyrites is being threatened probably for years to come, according to reports of the leading producer received by the Commerce Department's Chemical Division. Producers in other countries, notably Portugal, Scandinavia, and Yugoslavia, are benefiting by the civil war, and are concluding long term contracts with former customers.

In discussing the European pyrites trade, chairman of British Rio Tinto Co., which operates mines in Spain, stated at a recent meeting that business generally is being handicapped by the exchange situation in various countries.

A few countries, he stated, such as Germany, treat pyrites for the sulfur, iron and copper values but other countries export the cinders after burning the sulfur for sulfuric acid manufacture, either because they do not import enough copper-bearing pyrites to make copper extraction profitable or they do not require the ore residues for local industries.

Sale of several thousand acres of land, a large tract of coal and the personal property belonging to the Miner-Edgar Chemical Corp. and the Consolidation Chemical Corp., which was to have been held at Sutton, W. Va., June 19, was postponed until Aug. 12 by order of the federal court. Postponement was ordered after Miner-Edgar had paid $15,516.08 in back taxes to give it a chance to redeem the property.

Half of the total U. S. production, and 18 per cent. of the world production of talc is mined in the Gouverneur, N. Y. district, by two companies, the International Pulp Co., and W. H. Loomis Talc Corporation.

New highs for production, domestic sales, and exports of carbon black were established during 1936. Bureau of Mines reports production was 411,345,000 pounds, an increase of 8 per cent. over the peak reached in 1930 and 17 per cent. above 1935. Demand totaled 467,736,000 pounds, a 21 per cent. gain over the 1935 peak. Stocks on hand December 31, 1936, were 79,582,000 pounds, the lowest since 1928.

Re-opening the Johnsonburg, Pa., plant, L. Martin Co., was announced by Geo. A. Lewis, June 17. Production of carbon black will commence when new equipment can be installed and the plant placed in condition for full operation.

Paint manufacturers over the balance of the year will be forced to pay higher prices for many important raw materials. Most of the price increases were expected by the trade so that they did not come as any great surprise.

All grades of lithopone were advanced ⅛c; the titanium pigments were increased a similar amount; lead free zinc oxide is up ¼c, leaded is up ⅛ to ¼c, and seal grades are now quoted ½c higher. Red and yellow cadmium lithopones are higher as a result of the advances in normal and high strength white lithopones.

Many of the quotations on earth colors were revised upwards. Italian raw sienna is up ¼c with the exception of a few of the very light shades; Spanish red oxide was advanced ⅛c on July 1st to a basis of 3⅜c. French yellow ocher was also increased ⅛c. Higher replacement costs plus higher ocean freight rates are the reasons given for these advances. In some quarters an increase was looked for in carbon black but increased competition brought about by increased production probably was the deciding factor in holding the schedule for the balance of the year at unchanged levels. Some of the higher priced yellow oxides were advanced. Stearates are quoted for the 3rd quarter unchanged.

A 1c advance was placed in effect on butyl stearate, diamyl phthalate, dibutyl phthalate, and diethyl phthalate. All of the phthalates are scarce as a result of the shortage of phthalic anhydride. A 2c increase in tricresyl phosphate was also reported. Cobalt linoleate is now quoted 2 to 3c higher and the resinate ½ to 1½c higher.

The one important price decline of the month was that which took place in ester gum. This was the second reduction since the ending of the acute shortage in glycerine. For the third quarter producers are offering material at 10c for 75,000 lb. lots, 10¼c for carlots, and 10½c for l.c.l. quantities. It appears now that glycerine is likely to stabilize at the 21½c basis for carlots over the balance of the year unless the basic conditions controlling the market should suddenly shift.

Wet ground China clay is now quoted at $9 per ton in bulk and $12 per ton in paper bags. Varnish gums are generally firm. A ½c per lb. increase was put into effect for Batavia A/E early in the month and at the close all grades were again advanced from ⅜ to ⅞c per lb. The net gain from A/E was ⅞c per lb. Batu bold scraped gum was quoted at much higher levels and the carlot price is now 6¼c.

Important Price Changes

ADVANCED	June 30	May 31
Batavia A/E	$0.15¾	$0.15¼
Butyl stearate	.26	.25
Cadmium lithopones:		
Yellow	.45	.40
Red, light	.70	.65
Medium	.80	.75
Deep	.85	.80
Maroon	.95	.90
Diamyl Phthalate	.20½	.19½
Dibutyl Phthalate	.21	.20
Diethyl Phthalate	.19	.18
Lithopone	.04⅜	.04¼
Sienna, Italian	.12¾	.12½
Spanish red oxide	.03⅜	.03¼
Titanium pigments, bbls.	.06⅛	.06
Yellow ocher, French	.02⅜	.02¼
Zinc oxide	.06¼	.06
DECLINED		
Ester, gum	$0.10	$0.10¾

Paint manufacturers have been forced to increase their prices as a result of the higher costs of many raw materials but this apparently has failed to act as a check on sales. This is not difficult to understand for both new construction and repairs are in heavy volume and likely to continue so for some time. May building construction was 11% ahead of the corresponding period of last year. According to the F. W. Dodge figures for 37 states the total was $244,112,800 as compared with $269,934,200 for April, and $216,070,700 in May of last year. Residential building in May was 20% above May of last year but was under the April figure.

Not only are domestic paint markets showing sharp improvement but exports are currently running at from 30 to 40% ahead of the corresponding period of last year. April sales of paints, varnish, and lacquer and fillers totalled $46,345,474 as compared with $39,498,071 in March and $37,899,767 in April of last year. Sales for the first 4 months totalled $148,147,813 as compared with but $114,578,543 in the corresponding period of last year. Currently paint sales are thought to be at the record '29 level or even at a greater pace. Production, however, probably will show some seasonal decline over the next few months as the peak of the year is usually reached in the late spring and early summer. Nevertheless production is expected to stay well above the '36 level.

Canadian feldspar production, according to preliminary figures, Dominion Bureau of Statistics, was 4,776 tons for the first quarter of 1937. Feldspar imports for the quarter aggregated 33 tons appraised at $2,759, more than twice those of the same period in 1936.

Important Natural Tanstuffs Advanced

New Schedules Announced for Hypernic, Hematine, Fustic, and Logwood—Japan Wax Competitive—Shellac Prices at New Low—Mixed Trend In Naval Stores—Oils Markets Weak—

Seasonal contraction in certain divisions of the textile field had a depressing effect on the markets for many chemicals, raw materials, and chemical specialties employed in processing operations. Consumers of hypernic, hematine, fustic, and logwood took large quantities in view of the higher prices for these items which will prevail over the balance of the year. Other tanning materials were quiet. Leather producers reported some tapering off of manufacturing operations, yet tanneries are much more active than they were at the corresponding period of last year.

New schedule for fustic is as follows: crystals, 22 to 27c; liquid, 9½ to 13c; solid, 17½ to 19½c. For hematine the price range is 18 to 34c depending upon quantity. New schedule on hypernic is 28 to 36c for crystals; liquid, 16 to 21c; solid, 18½ to 20½c. Logwood suppliers are now quoting 18 to 22c for crystals; 9½ to 11½c for liquid, and 15 to 19c for solid. Other extracts, including sumac and myrobalans, are quoted at unchanged levels.

Generally quiet conditions prevailed last month in the wax markets. Carnauba is firm but still weaker prices are reported in Japan. There appears to be little demand for the moment and what little business does exist is keenly competitive. However, with current quotations below replacement costs there is a strong possibility that the market will shortly show firmer tendencies.

Shellac prices worked down to new low levels in a very bearish market last month. Bone dry was quoted at the month's close at 17½ to 18c; T. N. 12½ to 13c; superfine, 13½ to 14c. Competition is terrifically keen and yet purchasing even at existing levels is light. The unsettlement in the domestic market simply reflects the uncertain state that the London and Calcutta markets are in. Replacement prices have been going lower and this naturally has tended to depress domestic quotations.

Movement in naval stores was mixed last month. A few of the poorer grades gained, otherwise the market was off from the previous month's close. Turpentine was much weaker. Despite generally lower prices a note of optimism prevails and the general belief is that an upward movement is now in order. There appears to be some basis for this feeling. Government rosin stocks are said to have been completely disposed of but as yet the status of turpentine held (3,300,000 gals.) is not definitely known. Further it finally appears as though the plan to curtail production of naval stores will actually function. Finally, although receipts at primary markets to date are equal to or greater than at the same period a year ago stocks at the primary points are much smaller than they were at the corresponding date of '36. A comparison of end-of-the-month prices and stocks is given below:

Important Price Changes

ADVANCED

	June 30	May 31
Fustic, crystals	$ 0.22	$ 0.20
Liquid	.09½	.08½
Solid	.17½	.16
Hematine crystals	.18	.16
Hypernic, 51°	.16	.15
Logwood, 51°	.09½	.08½
Solid	.15	.13½
Myrobalans, S1	29.50	27.00
S2	20.75	20.25
R2	20.25	19.50

DECLINED

	June 30	May 31
Sumac, Italian	$59.00	$60.00
Valonia, beard	47.00	48.00
Cups	31.75	34.50

	June 30	May 28	Net Gain or Loss
B	$8.05	$7.20	+$0.85
D	8.05	7.30	+ 0.75
E	8.05	7.75	+ 0.30
F	8.05	8.12½	— 0.07
G	8.05	8.12½	— 0.07
H	8.05	8.12½	— 0.07
I	8.05	8.12½	— 0.07
K	8.05	8.12½	— 0.07
M	8.05	8.15	— 0.10
N	8.05	8.15	— 0.10
WG	8.05	8.20	— 0.15
WW	8.80	9.00	— 0.20
X	8.80	9.00	— 0.20
Stocks	55,916	44,632	+11,284
Turpentine	0.33¾	0.35½	— 0.01¾
Stocks	27,239	26,573	+666
JACKSONVILLE			
Rosin stocks	28,339	33,345	—5,006
Turpentine	29,021	26,590	+2,431
PENSACOLA			
Rosin stocks	20,351 (June 26)	18,430 (May 22)	+1,921
Turpentine	16,501 (June 26)	14,562 (May 22)	+1,939

Oils and fats generally worked into lower price levels in the past month continuing the trend of the past few months. Trading was light in nearly all items. The same statement can be made for offerings in the primary centers. An end-of-the-month comparison of the leading items in this group discloses the extent of the general price decline.

	June 30	May 31	Net Gain or Loss
Chinawood, tanks	$0.118	$0.128	—$0.01
Coconut, tanks	.05¼	.06½	— .01¼
Corn, crude, tanks	.08⅛	.08⅞	— .00¾
Lard, common, bbls.	.12¼	.12¼	....
Linseed, boiled, c. l.	.114	.117	— .003
Menhaden, crude	.40	.45	— .05
Neatsfoot, cold test, bbls.	.18¼	.18¼	....
Oleo, No. 1, bbls.	.13	.12⅜	+ .00⅝
Peanut, crude	.08¼	.09⅛	— .00⅞
Sardine, crude	.42½	.52	— .09½
Soybean, crude, tanks	.09½	.10½	— .01

Natural Raw Materials

New Phosphate Field Surveyed

The phosphate deposits recently found in the Cive region, Senegal, French West Africa, have been surveyed by a geological engineering mission, which sunk cross sections of one 60 foot cemented shaft in clay schist disclosing four strata of phosphate of varying thicknesses. The product is very white and samples run from 65 to 70 per cent. The preliminary researches and provisional estimates warrant expectations that the deposits will supply demands of all the colonies of the Federation.

The United States purchased approximately $350,000 worth of chrome ore from Greece in 1936 and continues to be the largest foreign consumer of high grade chrome ore produced in that country. The latest available official statistics of production of chrome ore in Greece are for the year 1935. These statistics show that since 1910, when the first production was recorded, the output has increased from between 7,000 and 10,000 tons to between 20,000 and 30,000 tons.

Available statistics show that exports of chrome ore from Greece to the United States have increased from 10,940 tons in 1934 to 25,945 tons in 1936. The next largest market is the United Kingdom, followed by Germany, Belgium and the Netherlands.

Perilla oil plants will be grown on a farm near Irwin, Ohio, where Glen McIlroy will be in charge of the experiment.

No statistics on oiticica oil production in Brazil are available owing to its recent development; it is obvious that production has been increasing. Many small crushing mills have sprung up in the northern section, the most important located in Ceara and Rio Grande do Norte. The U. S. is the largest purchaser of oiticica oil and out of a total exportation of 3,292,825 kilos in 1936, we received 1,922,538. Other important purchasers were Germany, 813,476 kilos, and Belgium, 268,659 kilos.

George B. Hughey of Ohio State University's Department of Chemical Engineering is with the Southern Kraft Corporation in Panama City, Fla., during the summer months.

H. F. Willkie, Detroit, expert in distilling research and practice, has joined Distillers Corporation-Seagram's Limited, and will be elected vice-president and director, to be in charge of plants and production of all subsidiary companies.

Financing Developments through Insurance Co.'s

Socony-Vacuum Sells $75,000,000 Bonds "Privately" in Biggest New Industrial Financing of Year—Funds Will Expand Work in Chemical Fields—

In what is said to be the largest single financing, excepting refunding operations, by any corporation since 1929, the Socony-Vacuum Oil Co. sold $75,000,000 debentures to five insurance companies last month. The transaction is of interest in that since this was a private sale there was no necessity to file with the Securities and Exchange Commission. Furthermore it is understood that a goodly slice of this new working capital will be employed in expanding chemical developments.

The Securities and Exchange Commission has been notified of the operation, although formal registration under the Securities Act was not necessary. It has been the policy of some companies formally to file a registration statement with the commission for new securities, even though disposed of privately to assure their legality in the event that the securities ever should reach the open market.

Socony-Vacuum has been carrying on a vigorous expansion program. In 1936 the capital expenditures amounted to about $76,000,000. It is understood that they will be equally large this year. In former years the company obtained funds for expansion from undistributed earnings, but with the tax on undistributed profits now in effect such procedure is heavily penalized.

The debentures mature in eighteen years and carry 3¼ per cent. They were sold at 98 to the Metropolitan Life, Prudential, New York Life, the Equitable and the Mutual Life Insurance Company of New York.

Hilton-Davis To Expand

The Hilton-Davis Chemical Co., Cincinnati, is applying to the Securities and Exchange Commission for additional securities to finance further plant expansion. A. Brooking Davis, president, said the application will be filed the middle of August. The amount of the new financing was not revealed.

Last fall the company applied for registration of 28,000 shares of $1.50 convertible preferred stock, par value $5, and 162,504 shares of $1 par value common stock. This financing was for plant improvements and for payment of outstanding obligations. Common and preferred stocks are listed on the Cincinnati Stock Exchange and were recently admitted to the Chicago Board of Trade.

Wall Street expects half year earnings in carbon black to be good—Columbian is forecast for 25 per cent. gain in net and better than this for United.

Monsanto Files With SEC

Monsanto Chemical Co. has registered 50,000 shares $4.50 cumulative preferred stock, Series A, no par value, with the Securities and Exchange Commission under the Securities Act of 1933. Proceeds will be added to general funds of the company and expended upon capital additions, replacements and improvements to plants, processes and facilities to meet increased demands for products and the continual changes in processes and equipment.

During 1935 more than $3,700,000 was spent by the company and its subsidiaries on over 200 items, and during 1936 upwards of $5,600,000 was similarly expended on more than 800 items.

Edward B. Smith & Co. is underwriter of the 50,000 shares of preferred stock. Offering price will be filed by amendment. The new stock is redeemable at $100 per share, plus a premium of $10 per share if redeemed prior to July 1, 1947, or a premium of $7.50 per share if redeemed thereafter.

National Oil Products Bonds Sold

Public offering of a new issue of $760,500 National Oil Products Co. fifteen-year convertible 4 per cent. debentures was made at a price of 99½. The debentures are convertible into common stock at the following rates for each $1,000 principal amount: 20 shares if converted on or before June 1, 1940; 18 shares thereafter through June 1, 1942; 16 shares thereafter through June 1, 1944; 14 shares thereafter through June 1, 1946; 12 shares thereafter through June 1, 1948; 10 shares thereafter to maturity, June 1, 1952.

Net proceeds from the sale of a total of $845,500 of these debentures, including those purchased by stockholders in advance of the public offering, will be used to retire bank loans and current indebtedness, to develop recently acquired plant at Cedartown, Ga., to provide new equipment for the main plant at Harrison, N. J., and for additional working capital.

Certain-teed Products Corporation, in a report to the Securities and Exchange Commission disclosed that Walter G. Baumhogger, president, had an option to buy 5,000 shares of the company's stock at $14 a share in 1937, and another 5,000 at the same price in 1938, plus any part of the first 5,000 not bought this year. The report did not indicate whether the president had exercised his option on the first 5,000 shares.

Wall St. Facts and Rumors

Solvay American Corp., (change of name from Solvay American Investment Corp.) has applied to list on the N. Y. Stock Exchange 139,648 shares of 5½ per cent. cumulative preferred stock ($100 par).

Report of Masonite Corp. for 40 weeks ended June 5, 1937, shows net income of $1,318,081 after depreciation and Federal income taxes, but without mention of undistributed profits taxes, equal after preferred dividend requirements of $85,141 to $2.29 a share on 536,702 common shares. In like 1936 period there was a net income of $927,948, equal after preferred dividends to $3.20 a share on 266,689 shares of common then outstanding.

General Paint Corp. has called a special meeting of stockholders for July 27 to amend articles so as to authorize the company to sell additional common stock without first offering it pro rata to stockholders. Under present requirements stockholders must be offered opportunity to purchase any additional stock company may desire to issue.

Dividends and Dates

Name	*Div.*	*Stock Record*	*Payable*
Air Reduction, e..	75c	June 30	July 15
Air Reduction, q..	25c	June 30	July 15
Am. Smelt. & Refg., q	75c	Aug. 6	Aug. 31
Bon Ami Co., A, q	$1.00	July 15	July 31
Bon Ami Co., B, q	62½c	July 15	July 31
Canadian Ind., Ltd. B, q	$1.50	June 30	July 31
Canadian Ind., Ltd. A, q	$1.50	June 30	July 31
Canadian Ind., Ltd. pf., q	$1.75	June 30	July 15
Du Pont, deb., q..	$1.50	July 9	July 24
Fansteel Met., $5 pf., q	$1.25	Sept. 15	Sept. 30
Fansteel Met., $5 pf., q	$1.25	Dec. 15	Dec. 17
Freeport Sulphur Co., pf., q	$1.50	July 15	Aug. 2
Harbison-Walker Ref., pf., q ...	$1.50	July 6	July 20
Int. Nickel of Can., pf., q	$1.75	July 3	Aug. 2
Jones & Laughlin, 7% pf. Ac. ...	$1.75	June 30	July 15
Lehigh Portland Cement, q	37½c	July 14	Aug. 2
Kellogg & Sons, Spencer,* Stk. 2%		Aug. 2	Aug. 16
Link Belt, q	50c	Aug. 14	Sept. 1
Lion Oil Ref., e..	25c	June 30	July 20
Lion Oil Ref., q..	25c	June 30	July 20
National Lead, pf. B, q	$1.50	July 16	Aug. 2
Newport Industries†	75c	July 8	July 26
Procter & Gamble, 8% pf., q	$2.00	June 25	July 15
Quaker Oats, pf., q	$1.50	Aug. 2	Aug. 31
Skelly Oil, pf., q.	$1.50	July 6	Aug. 2
Tennessee Corp...	25c	July 8	July 22
Texas Gulf Sulphur, q	50c	Sept. 1	Sept. 15
United Dyewood, pf., q	$1.75	Sept. 10	Oct. 1
United Dyewood, pf., q	$1.75	Dec. 10	Jan. 3
U. S. Smelt. Rfg. & Min.	$2.00	July 2	July 15
U. S. Smelt. Rfg. & Min., pf., q..	87½c	July 2	July 15

* Stockholders are given the option of taking $50 cash or 2 shares of common for each 100 shares held.

† Dividend is payable in 5% 10-year notes due July 26, 1947. Cash will be paid for all amounts less than $25 and for fractional parts of $25.

Stock Values Slump

The net value of the chemical stocks on the N. Y. Stock Exchange as of July 1st totalled $6,185,872,487 with an average price of $72.56. On Jan. 1st the same stocks had a value of $6,502,233,633 and an average price of $79.60, so that the net loss for the first half of the year amounted to $316,361,146 and $7.04 respectively.

Comparing closing prices on July 2nd with the end-of-the-year quotations on the same list of chemical stocks as given previously shows that only Allied and the 3 fertilizer companies in the group registered a net gain in the past 6 months.

	Close July 2	Close Dec. 31, '36	Net Gain or Loss Past 6 Months
Allied Chemical	231	226½	+ 4½
Air Reduction	70¼	78	— 7¼
Amer. Agr. Chem.	89	84½	+ 4½
Columbian Carbon	120	120	......
Commercial Solvents	13½	18¾	— 5¼
du Pont	152	173	—21
Int. Agricultural	5⅝	5	+ ⅝
Mathieson Alkali	33¾	40½	— 6¾
Monsanto	91½	98½	— 7
Newport Industries	32⅝	36⅜	— 3¾
Texas Gulf Sulphur	35¾	39¼	— 3½
Union Carbide	99⅝	103¾	— 4⅛
U. S. I.	30¼	38¾	— 8½
Va. Caro. Chem.	7⅞	7⅝	+ ¼

Trading on the N. Y. Stock Exchange continued in the doldrums during June. Public interest was lacking and even the professional traders were in a lethargic frame of mind. Price trends were naturally down in such a thin market. Business activity is good, yet market enthusiasm is totally lacking.

The Chase National Bank, trustee, has designated by lot for redemption on August 1, at 102 per cent. and accrued interest, out of sinking fund moneys, $356,000 principal amount of the A. E. Staley Manufacturing Co. first mortgage bonds, 4 per cent. series, due 1946.

Most of the chemical shares followed the general decline. The movement over the month was within very narrow limits as the following comparison of end-of-the-month prices indicates.

	Close July 2	May Close	Net Gain or Loss
Allied Chemical	231	232	—1
Air Reduction	70¾	72⅝	— ⅞
American Agr. Chem.	89	94	—5
Columbian Carbon	120	118¼	+1¾
Commercial Solvents	13½	13¾	— ¼
du Pont	152	156¾	—4¾
Int. Agricultural	5⅝	6¾	—1⅛
Mathieson Alkali	33¾	33¼	+ ½
Monsanto	91½	90½	+1
Newport Industries	32⅝	31¾	+ ⅞
Texas Gulf Sulphur	35¾	36½	— ¾
Union Carbide	99⅝	102	—2⅜
U. S. I.	30¼	33¼	—3
Va. Caro. Chem.	7⅞	9¼	—1⅜

Abbott Laboratories has filed registration statement, under Securities Act, covering 10,000 shares common stock, no par, to be sold to employes. Proceeds will be used for equipment, etc.

Price Trend of Chemical Company Stocks

	June 4	June 11	June 18	June 25	Net Gain or loss last month	Price on June 30, 1936	1937 High	1937 Low
Air Reduction	71	70½	65⅞	68	+ 3	68½	80¼	64½
Allied Chemical	229⅜	226	219⅝	218	—11⅜	198½	258½	215
Columbian Carbon	118	118	116	115¾	— 2¼		125¾	111
Com. Solvents	13⅝	14	13½	13¼	— ⅜	14⅞	21¼	13
du Pont	157	154½	153	153	— 4	149½	180⅛	148½
Hercules Powder	...	...	...	153¼	....	108	135½	125
Mathieson Alkali	33½	34¾	34	33¼	— ¼	29½	41¼	32⅞
Monsanto Chemical	90	89½	86⅜	86½	— 3½	94	101	85
Std. of N. J.	67⅛	65½	66	66⅜	— ¾	58⅞	76	63⅛
Texas Gulf Sulphur	35¾	35	34⅝	35¼	— ½	35¾	44	33¾
Union Carbide	101¼	98	99¾	98¼	— 3	89⅜	111	95
U. S. Ind. Alcohol	34½	32⅝	29¾	29½	— 5	35	43⅝	28

Devoe Earns $366,144

Report of Devoe & Raynolds Co. and subsidiaries for 6 months ended May 31, 1937, subject to year-end adjustments, shows profit of $366,144 after expenses, depreciation, etc., but before federal income and excess profits taxes, comparing with profit of $239,458 for the 6 months ended May 31, 1936.

E. S. Phillips, president, stated that the management is looking forward confidently to a continuation of the upward swing in Devoe & Raynolds' business during the fall, although a seasonal decline in activity may be expected during the summer months.

Freeport Earns 66c per Share

First quarter earnings of 66 cents a share on the 796,372 shares of common stock were reported by Langbourne M. Williams, Jr., president of the Freeport Sulphur Co., in a letter to stockholders. This is after provision for dividends on the preferred stock. Net income of the company for the quarter ended March 31, after all charges including depreciation, depletion and Federal taxes but before surplus tax on undistributed income, amounted to $543,287. This compares with earnings of $476,123, or 57c a common share for the first quarter of 1936. The above figures are shown after deduction of the proportionate part of the losses of the Cuban-American Manganese Corp., subsidiary of the Freeport Sulphur Co., whose proportion of these losses amounted to $174 for the first quarter of this year as against $32,417 for the first quarter of 1936.

Vanadium Sales Up

Vanadium Corp's. net income for the six months ended June 30 is expected to be somewhat more than double the $152,193, or 40 cents a share on the 376,637 shares of stock, earned in the full year 1936. In the first half of 1936, 11 cents a share was earned.

A hint of dividend payment is given in the replacement early in 1937 of the $876,739 note issue, which forbade common payments while it was outstanding, with a $600,000 debenture issue which contained no such provision.

Newport Industries, Inc., voted a dividend of 75 cents, payable July 26 to stock of record July 8. The dividend is payable in 5% 10-year notes due July 26, 1947. Cash will be paid for all amounts less than $25 and for fractional parts of $25. Prior to this declaration the company paid a dividend of 50 cents on April 5, last, and an initial disbursement of 60 cents on December 15, 1936.

Olin Wellborn 3d, a director and vice-president of Petroleum Securities Co., Los Angeles, has been elected a director of Tide Water Associated Oil Co. He replaces the late Robert M. Sands.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1937	Net income 1936	Common share earnings 1937	Common share earnings 1936	Surplus after dividends 1937	Surplus after dividends 1936
Jones & Laughlin Steel Corp.:							
Twelve months, Apr. 30	f	7,619,668	......	6.09	....	......	......
Masonite Corp.:							
40 weeks, June 5	$1.00	1,318,081	927,948	h2.29	h3.20	......	......
U. S. Smelt. Ref. & Mining Co.:							
Five months, May 31	w2.00	2,613,184	2,116,394	3.65	2.71	*......	*......
Valspar Corp.:							
Twelve months, May 31	f	299,162	†70,710	....	....	......	......
Wesson Oil & Snowdrift Co.:							
May 31 quarter	§.50	1,069,576	594,481	1.33	.51	......	......
Nine months, May 31	§.50	3,716,031	2,139,053	4.84	2.14	$1,368,354	$373,967

† Net loss; ‡ Profit before federal income taxes; § Plus extras; *a* On Class A stock; *b* On Class B shares; *c* On combined Class A and Class B shares; *f* No common dividend; *g* Report subject to audit and year-end adjustments; *h* On shares outstanding at close of respective periods; *k* Paid in year 1936; *m* Consolidated loss before federal income taxes; *p* On preferred; *r* On first preferred stock; *w* Last dividend declared; period not announced by company; *y* Declared in last 12 months; * Not available.

Chemical Stocks and Bonds

June Last	1937 High	1937 Low	1936 High	1936 Low	1935 High	1935 Low	Sales: Number of shares June 1937	Sales: Number of shares 1937	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per share-$ 1936	Earnings** $-per share-$ 1935
NEW YORK STOCK EXCHANGE														
69½	80¼	64½	86½	58	57½	35	28,800	134,800	Air Reduction	No	2,523,065	$2.50	2.79	2.10
217½	258½	215	245	157	173	125	7,400	74,400	Allied Chem. & Dye	No	2,214,099	6.00	11.44	8.71
88	101½	83	89	49	57¾	41½	4,900	42,600	Amer. Agric. Chem.	No	210,934	2.50	4.71	6.37
21	30¾	20½	35⅛	20½	35¾	22½	7,600	132,700	Amer. Com. Alcohol	20	260,947	.50	4.55	3.16
40	46	40	50	37	52	36	2,700	33,200	Archer-Dan-Midland	No	549,546	3.00	3.20	3.46
69	94	68½	84	48	48½	32¾	7,900	26,000	Atlas Powder Co.	No	248,660	3.50	4.21	2.81
119	133	113¾	131	112	115	106¾	1,890	3,310	5% conv. cum. pfd.	100	88,781	5.00	20.86	16.93
36⅝	41¼	26⅝	32¼	21¾	35⅜	19½	129,200	1,219,200	Celanese Corp. Amer.	No	1,000,000	1.50	2.25	1.99
111⅝	115	106½	116	106	111¼	97½	2,000	10,200	prior pfd.	100	164,818	7.00	27.25	35.34
19	25¾	17⅞	21¼	13	21	15⅛	31,600	498,400	Colgate-Palm.-Peet	No	1,956,086	.75	1.40	1.36
103	104½	102	106½	100	107¼	101	1,000	10,200	6% pfd.	100	246,496	6.00	17.12	16.79
117	125¾	111	136½	94	101¼	67	4,100	28,700	Columbian Carbon	No	537,586	5.75	7.48	5.56
13⅛	21¼	13	24⅝	14¼	23⅞	16½	47,200	513,200	Commercial Solvents	No	2,635,371	.80	.84	1.02
61½	71¼	54⅞	82½	63⅝	78⅜	60	20,200	158,100	Corn Products	25	2,530,000	3.75	3.86	2.62
156	157½	153	170	158	165	148¼	1,800	6,100	7% cum. pfd.	100	243,739	7.00	46.76	33.97
63	76⅛	60	63	42	50⅜	35½	500	13,000	Devoe & Rayn. A	No	95,000	2.00	4.49	2.89
135	159¼	129	142¼	94⅛	105½	80½	1,900	17,300	Dow Chemical	No	945,000	2.40	4.48	3.43
153	180⅛	148½	184¾	133	146½	86⅝	36,200	206,200	DuPont de Nemours	20	11,049,470	6.10	7.56	5.04
130¼	135½	130¼	136½	129	132	126⅞	2,000	11,500	6% cum. deb.	100	1,092,699	6.00	84.21	56.81
172½	175¼	151	185	156	172¼	110½	12,000	62,600	Eastman Kodak	No	2,250,921	6.75	8.24	6.90
...	...	...	166	152	164	141	330	2,270	6% cum. pfd.	100	61,657	6.00	306.64	258.09
27	32¼	24¼	35⅝	23½	30⅝	17¼	14,600	164,500	Freeport Texas	10	796,380	1.00	2.43	1.78
105½	117	105⅝	135	108	125	112½	320	880	6% conv. pfd.	100	12,[illegible]	6.00	163.38	121.30
43¼	51½	41	55¼	39½	49½	23⅜	13,000	162,100	Glidden Co.	No	603,304	2.00	3.29	2.91
52	58⅛	51½	56	52¼			1,800	14,700	4½% cum. pfd.	50	200,000	2.25	15.43	....
102	109¾	100⅝	133	99⅝	119½	85	2,800	17,100	Hazel Atlas	25	434,409	7.64	6.56	7.58
152	185	144⅞	5⅞	2⅞	90	71	900	15,800	Hercules Powder	No	583,672	5.44	6.33	4.23
130	135½	125	47¼	22¾	131	122	430	1,500	6% cum. pfd.	100	105,765	6.00	48.97	36.30
35	47½	33	66⅜	43¼	36⅜	23½	16,900	301,200	Industrial Rayon	No	606,500	2.10	2.24	1.00
54¾	64¼	41	...	...	...	...	2,700	3,500	Interchem.	No	288,358	2.75	3.02	2.74
110	111¼	107¼	...	...	...	...	430	620	6% pfd.	100	66,917	6.00	18.97	17.19
5¼	9⅛	5	30	23	5	2⅝	21,400	548,800	Intern. Agricul.	No	436,049	None	—1.55	—.99
43½	63½	42	36¾	29¼	42¾	26	4,000	101,200	7% cum. pr. pfd.	100	100,000	None	.23	2.69
57¾	73⅜	55⅛	80¼	47¼	47¼	22¼	161,300	1,175,000	Intern. Nickel	No	14,584,025	1.30	2.40	1.65
24	28¾	24	46½	32½	36¼	25	1,600	10,400	Intern. Salt	No	240,000	2.00	1.65	1.32
31	36	30¼	42⅜	27½	36¼	31	1,300	12,400	Kellogg (Spencer)	No	500,000	1.60	2.62	2.22
60	79	59⅜	103	79	49¼	21½	17,400	167,800	Libbey Owens Ford	No	2,503,168	3.50	4.15	3.26
47½	53⅞	43⅜	36½	26⅛	37¼	24½	5,500	77,500	Liquid Carbonic	No	342,406	1.60	.....	3.06
32⅝	41¾	32⅝	171	155	33⅞	23¾	8,500	76,300	Mathieson Alkali	No	830,428	1.50	1.76	1.44
89	101	85	147	137¾	94¾	55	6,500	64,600	Monsanto Chem.	10	1,114,409	3.00	4.01	3.84
33⅜	44	30⅜	40	9	20⅝	14½	23,600	301,700	National Lead	10	3,095,100	.875	1.71	1.08
154¾	171	154¾	164	125	162½	150	700	3,600	7% cum. "A" pfd.	100	213,793	7.00	33.83	25.40
133	150	133	56	40¼	140½	121⅛	......	930	6% cum. "B" pfd.	100	77,462	6.00	74.50	49.05
31½	41¾	28	122½	115¾	10⅞	4⅛	39,300	590,300	Newport Industries	1	519,347	.60	.98	.57
88	96½	82½	13	5⅝	129	80	19,[illegible]	[illegible]	Owens Illinois Glass	25	1,330,602	6.00	7.53	6.52
56⅞	65½	55½	146	84	53¾	42⅜	14,500	58,300	Procter & Gamble	No	6,410,000	1.87	2.39	2.32
117	118½	114½	135	126	121	115	300	2,180	5% pfd. (ser. 2-1-29)	100	171,569	5.00	94.14	88.15
11⅞	15⅜	10¾	41⅜	25⅝	8¾	4	29,400	322,600	Tenn. Corp.	5	853,696	.15	.47	.22
35	44	33¾	44¾	33	36¾	28¾	26,800	631,000	Texas Gulf Sulphur	No	2,540,000	2.50	.....	1.94
99¼	111	95	105¼	71⅝	75¾	44	31,800	260,600	Union Carbide & Carbon	No	8,903,138	2.30	4.09	3.06
80	91	69¾	96¾	68	78	46	5,700	51,100	United Carbon	No	397,877	4.05	5.54	4.71
30	43⅝	28	59	31¼	50⅝	35⅛	12,800	487,600	U. S. Indus. Alco.	No	391,033	1.00	—.20	2.16
26¼	39⅜	24⅛	30½	16¼	21¾	11¼	19,700	494,000	Vanadium Corp.-Amer.	No	366,637	None	.40	—1.13
7½	12¾	7	8½	4⅛	4⅝	2½	22,800	635,200	Virginia-Caro. Chem.	No	486,000	None	—2.56	—.79
51	74⅝	48½	58¾	28¾	35¾	17½	8,700	217,600	6% cum. part. pfd.	100	213,392	None	.16	4.20
20¼	27¼	19	32	19¾	25½	16¾	2,100	37,700	Westvaco Chlorine	No	284,962	.75	1.39	1.63
30	34⅞	29½	35¼	31¾			3,700	24,000	Westvaco Chlorine, cum. pfd.	30	192,000	1.50	3.26	.....
NEW YORK CURB EXCHANGE														
30⅛	35⅞	26⅝	40¾	29¼	30	15	37,500	341,700	Amer. Cyanamid "B"	No	2,404,194	1.00	1.77	1.61
2	2⅞	1⅞	3¾	2⅛	4	2	300	13,800	British Celanese Am. R.	10	2,806,000	None	—4.53	—.71
115	124	108½	116¼	99¼	115	90	925	11,425	Celanese, 7% cum. 1st pfd.	100	148,179	7.00	24.47	21.96
8¼	15	7¾	16½	9	15	7	800	11,300	Celluloid Corp.	15	194,952	None	—.80	—.95
12½	14⅝	12½	15	11⅞	14½	11⅛	......	2,200	Courtaulds' Ltd.	1 £	24,000,000	7½%	8.40%	7.51%
8	10⅝	6¾	10¾	5	12½	6¼	2,600	49,800	Duval Texas Sulphur	No	500,000	.50	.61	.16
39½	42⅞	39½	55	39	58	37	700	9,500	Heyden Chem. Corp.	10	149,997	2.25	3.56	3.22
123	147½	114½	140	98¼	97¼	46¾	5,100	37,700	Pittsburgh Plate Glass	25	2,142,443	6.00	7.15	5.32
122¾	154¾	118	154½	117	128⅞	84	4,800	32,950	Sherwin Williams	25	635.583	4.00	8.04	6.19
109¾	114	108	116	110	113½	106	190	1,780	5% pfd. cum.	100	155,521	5.00	41.44	33.17
PHILADELPHIA STOCK EXCHANGE														
175	179	162	179	114¼	116¾	76½	525	4,345	Pennsylvania Salt	50	150,000	8.50	10.59	7.74

June Last	1937 High	1937 Low	1936 High	1936 Low	1935 High	1935 Low	Sales June 1937	Sales 1937	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE													
106⅞	109½	105½	117½	107¾	116	104½	279,000	2,588,000	Amer. I. G. Chem. Conv. 5½'s	1949	5½	M. N.	29,929,000
33	42½	31	42½	27½	29¾	7⅜	99,000	1,558,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5		12,433,000
101	102	100	102¾	96¾	100¼	91⅛	30,000	181,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M. N.	5,994,100
31½	34¼	30¼	39	21	21½	7	188,000	1,881,000	Lautaro Nitrate conv. b's	1954	6	J. J.	31,357,000
25⅛	25½	20¾	35	23½	38	32⅛	4,000	22,000	Ruhr Chem. 6's	1948	6	A. O.	3,156,000
103½	105	103	105	103	104	91½	50,000	207,000	Tenn. Corp. deb. 6's "B"	1944	6	M. S.	3,007,900
101¾	111	98¼	98½	85¼	94¼	66	56,000	1,268,000	Vanadium Corp. conv. 5's	1941	5	A. A.	4,261,000

* Paid in 1936, including extras; ** For either fiscal or calendar years.

Industrial Trends

Mid-Year Price Adjustment Largely in the Pigments—June Tonnages Slightly Improved—Business Activity Holds Up Well Despite Labor Troubles —

The half-year price adjustment period has come and gone and except for raw materials in the paint group the number of actual revisions was very small. The rumors that the alkali schedule would be raised proved to be false. More nearly correct were the guesses that the acid makers would raise prices but the advances were held to carboy prices. Consumers of chemicals can now breathe more freely over the balance of the year, except on such items where quarterly adjustments are written into the contracts.

A few of the price changes announced last month are of particular interest. One cent increases on C.D. and S.D. alcohol and special solvent were placed in effect for the 3rd quarter. Tartars were again higher. The raw material, argols, is much higher and further advances are said to be quite likely. The glycerin market appears to have finally quieted down and stability is looked for over the balance of the year. Acute shortages of spot stocks of many of the important coal-tar chemicals are embarrassing those who failed to cover fully for their requirements and the situation promises to become worse rather than better over the next few months.

Shipments of chemicals into consuming hands were in slightly better volume, indicating that accumulations are dwindling. Producers are now in somewhat of a quandary. Many believe that the balance of the summer period will be quite active, while the remainder lean to the opinion that the usual "summer dullness" will be with us until after Labor Day.

General business activity continues to hold up remarkably well in spite of seasonal declines in some lines and the unsettled state of labor in many industries and especially in steel. Even with many of the mills in the Pittsburgh area closed for vacations and the independents operating at reduced schedules because of labor trouble steel activity in the final week of June was reported at 76½% of capacity. Carloadings and electric output are ahead of the figures for the corresponding weeks of last year. The *N. Y. Times* Index of Business Activity after showing a decline in the first half of June registered a slight gain in the final 2 weeks and on June 26th stood at 107.5, compared with 99.6 on June 27, 1936. Production in the automotive field is holding up remarkably well but some tapering off is now expected as producers begin to arrange for next year's models. In the textile field a slower pace is noted in cotton cloth production and in silk and wool but rayon manufacturers are hard pressed to make deliveries. Seasonal influences are affecting the glass, tanning, paper, rubber, and paint industries.

Silk deliveries in May totalled 35,278 bales compared with 40,561 bales in April and a 1936 average delivery of 37,900 bales. Rayon production holds at record levels and stocks on hand at the end of May amounted to 0.1 month's supply. All types of rayon fabricators are taking as much material as they can obtain from the producers. According to the *Rayon Organon* no diminishing of the demand is expected for the remainder of the year for the following reasons:—First, there have been no recent excesses of consumption, second, little new rayon producing capacity will come into operation during the balance of the year, third, current adequate rayon yarn and cloth stocks in the hands of fabricators will quickly disappear when the Fall fabric producing season really gets under way during the next month, fourth, rayon prices are cheap compared to other textile fibers.

On the other hand curtailment in cotton cloth production is generally looked for over the next few months in view of the very high rate of activity that has prevailed over the first half of the year. Dullness is anticipated in woolens for the next month but improvement is then expected.

Despite the relatively high rate of business activity industrialists are apprehensive. The labor situation is alarming. Union leaders appear to have no fear of violating contracts and public officials as a general rule seem to be willing to countenance flagrant abuses if they bear a C.I.O. label. Fortunately public opinion is rapidly crystallizing and the pendulum may very quickly swing in the opposite direction.

Another factor which adds to the confusion is the continued weakness in the commodity markets. Executives are finding it difficult to plan forward commitments for fall and winter business in face of the uncertainty that now exists.

Retail trade holds up very well. In many sections of the country buying is 10 to 20% above the corresponding period of last year. This condition is, of course, reflected in the wholesale trade. Wholesalers report buying is largely for immediate needs, however, and at the moment there is a decided tendency to put off making future commitments.

Statistics of Business

	May 1937	May 1936	April 1937	April 1936	March 1937	March 1936
Automotive Production	516,899	460,512	536,334	502,775	*k*494,276	323,160
Bldg. Contracts*‡	$244,112	$216,071	$270,125	$234,632	$231.246	$199.028
Failures, Dun & Bradstreet	834	832	786	830	*d*183	*d*196
Merchandise Imports‡	......	$191,110	$287,252	$170,500	$306,699	$200,295
Merchandise Exports‡	......	......	$266,171	$164,151	$256,390	$195,336
Newsprint Production						
Canada, tons	302,232	267,067	......	258,721	310,110	243,900
U. S., tons	79,003	75,719	......	......	......	76,507
Plate glass prod., sq. ft.	19,437,246	19,192,114	21,955,771	19.454,774	20,742,575	16.057,196
Steel ingots production, tons	5,153,559	4,046,253	‡5,072	‡3,923	5,229,431	3.346,489
Pig iron production, tons	3,537,231	2,648,401	‡3,459	‡2,404	3,459,473	2,040,311
U. S. consumption, crude rubber, tons	51,733	50,612	51,797	52,031	54,064	42,703
Tire shipments	......	......	......	......	*x*5,787	3,855,970
Tire production	......	......	......	......	*x*5,916	3,637,969
Tire inventory	......	......	......	......	12,448	9,087,020
Dept. of Labor Indices†						
Factory payrolls, totals†	105.1	80.8	104.8	77.9	101.2	76.3
Factory employment†	102.2	89.8	102.2	85.1	101.0	84.1
Chemical employment†*a*	137.5	117.2	135.6	115.8	125.0	113.8
Chemical payrolls†*a*	151.9	111.3	150.6	109.1	129.2	102.2
Chemicals and Related Products						
Exports‡	$13,235	$10,512	$12,437	$9,837	$12,149	$10,608
Imports‡	$9,152	$6,381	$11,025	$7,313	$10,781	$7,327
Stocks, mfg. goods	......	......	......	......	......	132
Stocks, raw materials	......	......	......	......	......	81
Boot and shoe production	......	......	39,886,891	33,397,785	45,946,407	34,381,676

Week Ending	Carloadings 1937	Carloadings 1936	Carloadings % of Change	Electrical Output§ 1937	Electrical Output§ 1936	Electrical Output§ % of Change	Jour. of Com. Price Index	Nat'l Fertilizer Ass'n Price Indices: Chem. & Drugs	Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups	‡‡Labor Dept. Chem. & Drug Price Index	%*r* Steel Activity	N. Y. Times Index Bus. Act.	Fisher's Index Pur. Power
May 29	794,855	646,812	+22.9	2,206,713	1,954,830	+12.9	90.8	93.7	79.6	72.5	77.3	88.0	83.6	77.4	109.7	107.2
June 5	692,140	695,844	— 0.5	2,131,092	1,922,108	+10.9	90.2	93.7	78.7	72.2	77.3	87.4	83.3	76.2	107.8	108.0
June 12	754,360	686,643	+ 9.9	2,214,166	1,945,018	+13.8	89.5	93.7	79.3	72.1	77.3	86.09	83.4	76.6	107.1	108.7
June 19	756,289	690,667	+ 9.5	2,213,783	1,989,798	+11.3	89.9	93.7	76.2	72.1	77.3	86.4	83.5	75.9	107.2	108.8
June 26	773,733	713,588	+ 8.4	2,238,332	2,005,243	+11.6	91.3	93.7	75.8	72.0	77.3	87.4	83.0	75.0	107.5	108.8

* 37 states; † Dept. of Labor, 3 year average, 1923-1925 = 100.0; ‡ 000 omitted; § K.W.H., 000 omitted; *a* Includes all allied products but not petroleum refining; ‡‡ 1926-1928 = 100.0; *y* Preliminary; *z* Revised; *r* Weeks May 31, June 7, 14, 21, 28.

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Prices Current

●

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc. **●**

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1936 Average $1.18 - Jan. 1937 $1.11 - June 1937 $1.09

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Acetaldehyde, drs, c-l, wks lb.	...	.14	...	.14	...	.14
Acetaldol, 95%, 50 gal drs wks .... lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kegs .. lb.	.32	.43	.32	.43	.38	.43
Acetanalid, tech, 150 lb bbls lb.	.24	.26	.24	.26	.24	.26
Acetic Anhydride, 100 lb cbys lb.	.20	.24	.20	.24	.21	.25
drs, f.o.b. wks, frt allowed .... lb.	.14	.15	.14	.15	...	.15
Acetin, tech, drs .... lb.	...	.33	.22	.33	.22	.24
Acetone, tks, f.o.b. wks, frt allowed .... lb.	...	.05	.05	.06½	.06	.11
drs, c-l, f.o.b. wks, frt allowed .... lb.	...	.06	.06	.07½	.07	.12
Acetyl chloride, 100 lb cbys lb.	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls .... lb.	.09¾	.10	.06¾	.10	.06¾	.07
Acetic, 28%, 400 lb bbls, c-l, wks .... 100 lbs.	...	2.53	2.25	2.53	...	2.45
glacial, bbls, c-l, wks 100 lbs.	...	8.70	8.00	8.70	...	8.43
glacial, USP, bbls, c-l, wks .... 100 lbs.	...	10.75	10.50	12.43	...	12.43
Adipic, kgs, bbls .... lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls ... lb.	.85	.95	.85	.95	.85	.95
tech, bbls .... lb.	...	.75	...	.75	...	.75
Battery, cbys, delv ... 100 lbs.	1.45	2.60	1.35	2.60	1.35	2.50
Benzoic, tech, 100 lb kgs .. lb.	.43	.47	.43	.47	.40	.45
USP, 100 lb kgs .... lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv .... ton *a*	...	95.00	...	95.00	...	95.00
Broenner's, bbls .... lb.	...	1.11	...	1.11	1.11	1.25
Butyric, edible, c-l, wks, cbys .... lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks .. lb.	...	.22	...	.22	...	.22
wks, lcl .... lb.	...	.23	...	.23	...	.23
tks, wks .... lb.	...	.21	...	.21	...	.21
Camphoric, drs .... lb.	5.50	5.70	5.50	5.70	...	5.25
Chicago, bbls .... lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks .... lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%. drs, delv lb.	.14¾	.16¾	.14¾	.16¾	.14¾	.16¾
Citric, USP, crys, 230 lb bbls .... lb. *b*	.25	.26	.25	.26	.25	.29
anhyd, gran, bbls .... lb. *b*	...	.27½	.27½	.29	.29	.31
Cleve's, 250 lb bbls .... lb.	.50	.52	.50	.52	.50	.54
Cresylic, 99%, straw, HB, drs, wks, frt equal .. gal.	.89	.91	.72	.91	.51	.74
99%, straw, LB, drs, wks, frt equal .... gal.	.92	.94	.77	.94	.68	.79
resin grade, drs, wks, frt equal .... lb.	.10¾	.11¼	.09	.11¼	.52*y*	.65*y*
Crotonic, drs .... lb.	.75	1.00	.75	1.00	.90	1.00
Formic, tech, 140 lb drs .. lb.	.11	.13	.11	.13	.11	.13
Fumaric, bbls .... lb.	...	.60	...	.60	...	.60
Fuming, see Sulfuric (Oleum)						
Fuoric, tech, 90%, 100 lb. drs lb.	.35	.45	.35	.45	...	.35
Gallic, tech, bbls .... lb.	.65	.68	.65	.68	.65	.68
USP, bbls .... lb.	.77	.80	.77	.80	.70	.80
Gamma, 225 lb bbls, wks .. lb.	...	.85	...	.85	.80	.85
H, 225 lb bbls, wks .... lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 10% sol. cbys .... lb.	.50	.51	.50	.51	.50	.51
Hydrobromic, 34% com 155 lb cbys, wks .... lb.	.42	.44	.40	.42	...	...
Hydrochloric, see muriatic.						
Hydrocyanic, cyl, wks .... lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks .... lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks .... lb.	.10½	.15	.10½	.15	.11	.12
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.05
22%, light ref'd, bbls ... lb.	.03½	.03¾	.03½	.03¾	.03½	.07
44%, light, 500 lb bbls .. lb.	.05½	.05¾	.05½	.05¾	.05½	.12
44%, dark, 500 lb bbls .. lb.	.06½	.06¾	.06½	.06¾	.06½	.10
50%, water white, 500 lb bbls .... lb.	.10½	.11½	.10½	.11½	.10½	.14½
USP X, 85%, cbys .... lb.	.42	.45	.42	.50	.45	.50
Laurent's, 250 lb bbls .... lb.	.45	.46	.45	.46	.45	.47
Linoleic, bbls .... lb.	...	.20	.16	.20	.16	.16
Maleic, powd, kgs .... lb.	.30	.40	.29	.40	.29	.32
Malic, powd, kgs .... lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls .... lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks ...... N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls .... lb.	1.50	1.60	1.50	1.60	1.50	1.60

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls. *y* Price given is per gal.

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Muriatic, 18°, 120 lb cbys, c-l, wks .... 100 lb.	...	1.50	1.35	1.50	...	1.35
tks, wks .... 100 lb.	...	1.00		1.00	...	1.00
20°, cbys, c-l, wks .. 100 lb.	...	1.75	1.45	1.75	...	1.45
tks, wks .... 100 lb.	...	1.10		1.10	1.10	1.20
22°, c-l, cbys, wks .. 100 lb.	...	2.25	1.95	2.25	...	1.95
tks, wks .... 100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys .... lb.	.06½	.07⅛	.06½	.07⅛	.06½	.07⅛
N & W, 250 lb bbls .... lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	.13	.10	.14	.11	.14
Sludges, drs .... lb.	...	.05	.05	.10	.06	.10
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks .... 100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks .. 100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks .. 100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks .. 100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv .... lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N. Y. .... lb.	.10¾	.12	.10¾	.12	.10¾	.12½
Phosphoric, 50%, USP, cbys lb.	.12	.14	.12	.14	.14	.14
50%, acid, c-l, drs, wks .. lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks .. lb.	.09	.10½	.09	.10½	.09	.10½
Picramic, 300 lb bbls, wks lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks .... lb.	.35	.40	.35	.40	.30	.40
Propionic, 98% wks, drs .. lb.	...	.20	.20	.22	...	.35
80% .... lb.	.16	.17½	.16	.17½	.15	.17½
Pyrogallic, crys, kgs, wks .. lb.	1.55	1.60	1.55	1.65	1.55	1.65
Ricinoleic, bbls .... lb.	...	.38	.35	.38	...	...
Salicylic, tech, 125 lb bbls, wks .... lb.	...	.33	...	.33	...	.40
Sebacic, tech, drs, wks .... lb.	...	.58	...	.58	...	.58
Succinic, bbls .... lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.19
Sulfuric, 60°, tks, wks ... ton	.	12.00		12.00	11.00	12.00
c-l, cbys, wks .... 100 lb.	...	1.25	1.10	1.25	...	1.10
66°, tks, wks .... ton	...	15.50	.	15.50	...	15.50
c-l, cbys, wks .... 100 lb.	...	1.35		1.35	...	1.35
CP, cbys, wks .... lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks .... ton	...	18.50	...	18.50	.	18.50
Tannic, tech, 300 lb bbls .... lb	.26	.32	.19	.36	.19	.40
Tartaric, USP, gran, powd, 300 lb bbls .... lb.	.24¾	.25¼	.21¾	.25¼	.22¾	.24
Tobias, 250 lb bbls .... lb.	.65	.67	.65	.67	.65	.72½
Trichloroacetic bottles .... lb.	2.00	2.50	2.00	2.50	2.45	2.75
kgs .... lb.	...	1.75	...	1.75	.	1.75
Tungstic, tech, bbls .... lb.	...	2.75	2.50	2.75	1.50	1.60
Vanadic, drs, wks .... lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb bbls .... lb.	.55	.60	.47	.60	.50	.60
dark, bbls .... lb.	.11	.15	.11	.17	.12	.17
egg, edible .... lb.	...	1.05	.76	1.05	.77	1.05
vegetable, edible .... lb.	.74	.78	.76	.78	.65	.70
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv .... lb.	...	.123	...	.123	.123	.143
c-l, drs, delv .... lb.	...	.133	...	.133	.133	.150
lcl, drs, delv .... lb.	...	.143	...	.143	.143	.157
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	.08½	.108
Benzyl, cans .... lb.	.70	1.10	.65	1.10	.65	1.10
Butyl, normal, tks, f.o.b. wks, frt allowed .... lb. *d*	...	.09	.08½	.09	.08½	.11
c-l, drs, f.o.b. wks, frt allowed .... lb. *d*	...	.10	.09½	.10	.09½	.12
Butyl, secondary, tks, delv .... lb. *d*	...	.07	...	.07	.07	.096
c-l, drs, delv .... lb. *d*	...	.08	...	.08	.08	.106
Capryl, drs, tech wks .. lb.	...	.85	...	.85	...	.85
Cinnamic, bottles .... lb.	2.50	3.65	2.50	3.65	2.50	3.65
Denatured, CD, No. 1, 12, 13, c-l, drs, wks .. gal. *e*	...	.35	.33	.35	.30	.44*
Western schedule, c-l, wks .... gal. *e*	...	.28	.37	.39	.39	.52*
Denatured, SD, No. 1, tks	..	.27	.26	.27	.23	.28
c-l, drs, wks ..... gal. *e*	.	.33	.32	.33	.29	.34
Diacetone, tech, tks, delv lb. *f*	...	.11½	..	.11½	...	.16
c-l, drs, delv .... lb *f*	...	.12½	...	.12½	...	.17
Ethyl, 190 proof, molasses, tks .... gal. *g*	...	4.06	4.05	4.07	4.07	4.10
c-l, drs .... gal. *g*	.	4.12	4.11	4.12	4.11	4.27
c-l, bbls .... gal. *g*	..	4.13	4.12	4.13	4.12	4.28
absolute, drs .... gal. *g*	4.54	6.08½	4.54	6.08½	4.54	6.11½

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case; * Dealers were given 20% off this price.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

Prices—Current

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Alcohols (continued)						
Furfuryl, tech, 500 lb drs lb.	.30	.35	.30	.35	...	.35
Hexyl, secondary tks, delv lb.	...	.12	.11½	.12	...	.11½
c-l, drs, delv lb.	...	.13	.12½	.13	...	.12½
Normal, drs, wks lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	...	.32
drs, lcl, delvd lb.	...	.27	...	.27	...	.27
Isobutyl, ref'd, lcl, drs lb.	...	.10	...	.10	.10	.12
c-l, drs lb.	...	.09½	...	.09½	.09½	.11½
tks lb.	...	.08½	...	.08½	.08½	.10½
Isopropyl, refd, c-l, drs, f.o.b. wks, frt allowed lb.	...	.39½	.39½	.45	.45	.55
Propyl, norm, 50 gal drs gal.	...	.75	...	.75	...	.75
Special Solvent, tks, wks gal.	...	.28	.27	.28	.24	.32
Aldehyde ammonia, 100 gal drs lb.	.80	.82	.80	.82	.80	.82
Alphanaphthol, crude, 300 lb bbls lb.	...	.52	...	.52	.52	.65
Alphanaphthylamine, 350 lb bbls lb.	.32	.34	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks 100 lb.	...	3.25	3.00	3.25	...	3.00
delv NY., Phila 100 lb.	...	3.40	3.15	3.40	...	3.15
less than 25 bbls, wks 100 lb.	...	3.50	3.25	3.50	...	3.25
Granular, c-l, bbls. wks 100 lb.	...	3.00	2.75	3.00	...	2.75
Powd, c-l, bbls, wks 100 lb.	...	3.40	3.15	3.40	...	3.15
Chrome, bbls 100 lb.	7.00	7.25	7.00	7.25	7.00	7.25
Potash, lump, c-l, bbls, wks 100 lb.	...	3.50	3.25	3.50	...	3.25
25 bbls or more, wks 100 lb.	...	3.75	3.40	3.75	...	3.40
Granular, c-l, bbls, wks 100 lb.	...	3.25	3.00	3.25	...	3.40
25 bbls or more, bbls, wks 100 lb.	...	3.50	3.25	3.50	...	3.00
Powd, c-l, bbls, wks 100 lb.	...	3.65	3.40	3.65	...	3.40
25 bbls or more, wks 100 lb.	...	3.90	3.55	3.90	...	3.55
Soda, bbls, wks 100 lb.	...	3.25		3.25		
Aluminum metal, c-l, NY 100 lb.	...	20.00	19.00	20.00	19.00	20.00
Acetate, CP, 20%, bbls lb.	.09	.10	.09	.10	.09	.10
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07	.12
93%, wks lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks lb.	.06	.06¼	.06	.06¼	.06	.07
Solution, drs, wks lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03½
Hydrate, 96%, light, 90 lb bbls, delv lb.	.13	.15	.13	.15	.13	.15
heavy, bbls, wks lb.	.029	.03½	.029	.03½	.029	.04½
Oleate, drs lb.	.16¾	.18½	.16¾	.18½	.15¾	.18½
Palmitate, bbls lb.	.22	.23	.22	.23	.21	.22
Resinate, pp., bbls lb.	...	.15	...	.15	...	.15
Stearate, 100 lb bbls lb.	.19	.21	.19	.21	.18	.21
Sulfate, com, c-l, bgs, wks 100 lb.	...	1.35	...	1.35	...	1.35
c-l, bbls, wks 100 lb.	...	1.55	...	1.55	...	1.55
Sulfate, iron-free, c-l, bgs, wks 100 lb.	...	1.90	...	1.90	...	1.90
c-l, bbls, wks 100 lb.	...	2.05	...	2.05	...	2.05
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd com, tks lb.	.04½	.05½	.04½	.05½	.04½	.05½
Ammonia anhyd, 100 lb cyl lb.	.16	.22	.16	.22	.15½	.22
26°, 800 lb drs, delv lb.	.02¼	.02½	.02¼	.02½	.02¼	.03
Aqua 26°, tks, NH cont.	...	.04½	...	.04½	.04½	.05
tk wagon lb.	...	.02	...	.02	.02	.024
Ammonium Acetate, kgs lb.	.26	.33	.26	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks 100 lb.	5.15	5.71	5.15	5.71	5.15	5.71
Bifluoride, 300 lb bbls lb.	.16	.17	.16	.17	.15	.17
carbonate, tech, 500 lb bbls lb.	.08	.12	.08	.12	.08	.12
Chloride, White, 100 lb bbls, wks 100 lb.	4.45	4.90	4.45	4.90	4.45	4.90
Gray, 250 lb bbls, wks 100 lb.	5.50	6.25	5.00	6.25	5.00	5.75
Lump, 500 lbs cks spot lb.	.10½	.11	.10½	.11	.10½	.11
Lactate, 500 lb bbls lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls lb.	...	.23	...	...	...	...
Linoleate lb.	...	.15	.11	.15	.11	.12
Naphthenate, bbls lb.	...	.17	...	...	...	...
Nitrate, tech, cks lb.	.03¾	.04	.03¾	.04	.04	.05
Oleate, drs lb.	...	.15	.15	.10	...	.10
Oxalate, neut, cryst, powd, bbls lb.	...	.22½	.22½	.23	.26	.27
pure, cryst, bbls, kgs lb.	.27	.28	.27	.28	.27	.28
Perchlorate, kgs lb.	...	.16	...	.16	...	.16
Persulfate, 112 lb kgs lb.	.21	.24	.21	.24	.21	.25
Phosphate, dibasic tech, powd, 325 lb bbls lb.	.07½	.10	.07½	.10	.07½	.10
Ricinoleate, bbls lb.	...	.15	...	...	...	...
Stearate, anhyd, bbls lb.	...	.24	...	...	...	...
Paste, bbls lb.	...	.07½	...	...	...	...
Sulfate, dom, f.o.b., bulk ton	...	26.50	26.00	27.00	22.00	26.00
200 lb bgs ton	...	nom.	...	nom.	...	nom.
100 lb bgs lb.	...	nom.	...	nom.	...	nom.
Sulfocyanide, kgs lb.	...	.55	...	.55	...	.55
Amyl Acetate (from pentane) tks, delv lb.	...	.11½	...	.11½	.11½	.13½
tech, drs, delv lb.	.11½	.12	.11½	.13½	.12½	.149
Secondary, tks, delv lb.	...	.08½	...	.08½	...	.108
c-l, drs, delv lb.	...	.09½	...	.09½	.118	.123
Chloride, norm, drs, wks lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks lb.	.07	.077	.07	.077	.07	.077
tks, wks lb.	...	.06	...	.06	...	.06
Mercaptan, drs, wks lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs lb.	...	.25	...	.25	...	...
Stearate, lcl, wks, drs lb.	...	.26	...	.26	...	...

g Grain alcohol 20c a gal. higher in each case.

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Amylene, drs, wks lb.	.102	.11	.102	.11	.102	.11
tks, wks lb.	...	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks lb.	.15	.17½	.15	.17½	.15	.17½
Annatto fine lb.	.34	.37	.34	.37	.34	.37
Anthracene, 80% lb.	...	.75	...	.75	...	.75
40% lb.	...	.18	...	.18	...	.18
Anthraquinone, sublimed, 125 lb bbls lb.	...	.65	.50	.65	.50	.52
Antimony metal slabs, ton lots lb.	...	.14⅛	.13⅝	.17	.11⅜	.14
Butter of, see Chloride.						
Chloride, soln cbys lb.	...	.17	...	.17	.13	.17
Needle, powd, bbls lb.	.17½	.19½	.14	.19½	.11	.12½
Oxide, 500 lb bbls lb.	.16½	nom.	.14¼	.16½	.12¾	.14
Salt, 63% to 65%, tins lb.	.23¾	.24	.22	.24	.22	.24
Sulfuret, golden, bbls lb.	.22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls lb.	.21	.27	.21	.27	.21	.27
Double, 600 lb bbls lb.	.18	.20	.18	.20	.18	.20
Aroclors, wks lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbl lb.	.08½	.09	.08½	.09¾	.08¾	.09¾
Arsenic, Metal lb.	.42	.44	.42	.44	.40	.44
Red, 224 lb cs kgs lb.	...	.15¾	...	.15¾	...	.15¾
White, 112 lb kgs lb.	.03	.04	.03	.04	.03	.04½
Barium Carbonate precip, 200 lb bgs, wks ton	52.50	62.50	52.50	62.50	56.50	61.00
Nat (witherite) 90% gr, c-l, wks, bgs ton	...	44.00	42.00	45.00	42.00	45.00
Chlorate, 112 lb kgs, N Y lb.	.16½	.17½	.16½	.17½	.15½	.17½
Chloride, 600 lb bbls, wks ton	72.00	74.00	72.00	74.00	72.00	74.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls lb.	.04¾	.05½	.04¾	.05½	.05¼	.06
Nitrate, bbls lb.	.07	.08¼	.07	.08¼	.07	.08¼
Barytes, floated, 350 lb bbls wks ton	...	23.65	23.65	23.65	23.65	23.65
Bauxite, bulk, mines ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, No. 1, bgs, wks ton	...	16.00	...	16.00	...	16.50
No. 2 ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb drs, wks lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind, 8000 gal tks, frt allowed ga.	...	.16	...	.16	.16	.18
90% c-l, drs gal.	...	.21	...	.21	...	.23
Ind pure, tks, frt allowed gal.	...	.16	...	.16	.16	.18
Benzidine Base, dry, 250 lb bbls lb.	.70	.72	.70	.72	.70	.74
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, tech, drs lb.	.30	.40	.30	.40	.30	.40
Beta-Naphthol, 250 lb bbl, wks lb.	.23	.24	.23	.24	.24	.27
Naphthylamine, sublimed, 200 lb bbls lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls lb.	.51	.52	.51	.52	.51	.55
Bismuth metal lb.	1.00	1.10	1.00	1.10	1.00	1.10
Chloride, boxes lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes lb.	3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes lb.	...	2.95	2.75	3.04	2.95	3.00
Subbenzoate, boxes lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs lb.	1.23	1.58	1.23	1.58	1.40	1.45
Trioxide, powd, boxes lb.	...	3.57	3.45	3.57	3.45	3.50
Subnitrate lb.	1.22	1.48	1.30	1.48	1.30	1.35
Blackstrap, cane (see Molasses, Blackstrap).						
Blanc Fixe, 400 lb bbls, wks ton h	40.00	75.00	40.00	75.00	42.50	70.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY unit	...	3.50	3.50	4.30	2.50	4.25
Chicago, high grade unit	...	3.50	3.50	4.65	2.90	4.50
Imported shipt unit	3.65	3.70	3.60	4.10	[illegible]	3.75
Blues, Bronze Chinese Milori Prussian Soluble lb.	.36	.37	.36	.37	.37	.38½
Ultramarine,* dry, wks, bbls lb.	...	.10	...	.10	...	.10
Regular grade, group 1 lb.	...	.15	...	.15	...	.15
Special, group 1 lb.	...	.18	...	.18	...	.18
Pulp, No. 1 lb.	...	.26	...	.26	...	.26
Bone, 4½ + 50% raw, Chicago ton	29.00	30.00	26.00	28.00	20.00	25.00
Bone Ash, 100 lb kgs lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls lb.	.06½	.08¼	.05½	.08¼	.05½	.08¼
Meal, 3% & 50%, imp ton	...	27.50	25.00	27.50	23.00	26.00
Domestic, bgs, Chicago ton	25.00	27.00	19.00	27.00	16.00	20.00

BORAX

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Borax, tech, gran, 80 ton lots, sacks, delv ton i	...	42.00	40.00	42.00	...	40.00
bbls, delv ton i	...	52.00	50.00	52.00	...	50.00
Tech, powd, 80 ton lots, sacks ton i	...	47.00	45.00	47.00	...	45.00
bbls, delv ton i	...	57.00	56.00	57.00	...	56.00
Bordeaux Mixture, consumers, East, c-l, tins, drs, cases lb.	.10½	.11	.10½	.11	.08	.16
Dealers, East, c-l lb.	.10	.10½	.10	.10½	.08½	.16½

h Lowest price is for pulp, highest for high grade precipitated; i Crystals $6 per ton higher; USP, $15 higher in each case; * Freight is equalized in each case with nearest producing point.

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Bromine, cases lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.80	1.50	.80	1.50
Gold, blk lb.	.45	.65	.40	.65	.40	.55
Butanes, com 16-32* group 3 tks lb.	.02¼	.03¾	.02¼	.03¾	...	.04
Butyl, Acetate, norm drs, frt allowed lb.	.10	.10½	.10	.10½	.09½	.12½
tks, frt allowed lb.	...	.09	...	.09	.08½	.11
Secondary, tks, frt allowed lb.	...	.07	.07	.07½	.07½	.096
drs, frt, allowed lb.	.08	.08½	.08	.09	.106	.111
Aldehyde, 50 gal drs, wks lb.	...	.17½	.16½	.17½	.19	.21
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Lactate lb.	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs, frt allowed lb.	...	.25	...	.25	...	...
Propionate, drs lb.	.18	.18½	.18	.18½	.18	.18½
tks, delv lb.	...	.17	...	.17	...	.17
Stearate, 50 gal drs lb.	...	.26	.25	.26	...	.26
Tartrate, drs lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	...
Cadmium Metal lb.	...	1.20	1.05	1.20	.75	1.05
Sulfide, boxes lb.	.90	1.00	.90	1.00	.90	1.10
CALCIUM						
Calcium, Acetate, 150 lb bgs c-l, delv 100 lb.	...	2.25	2.10	2.25	...	2.10
Arsenate, jobbers, East of Rocky Mts, drs lb.	.06¼	.06⅜	.06	.06⅜	.06	.06⅜
dealers, drs lb.	.06¾	.07¾	.06¼	.07¾	.06¼	.07¾
South, dealers, drs lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
Carbide, drs lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l lb.	1.00	1.00	1.00	1.00	1.00	1.00
Chloride, flake, 375 lb drs, c-l, delv ton	...	22.00	...	22.00	...	22.00
Solid, 650 lb drs, c-l, delv ton	...	20.00	...	20.00	...	20.00
Ferrocyanide, 350 lb bbls wks lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls lb.	.50	.57	.50	.57	.50	.57
Nitrate, 100 lb bgs ton	...	26.10	...	26.10	...	26.50
Palmitate, bbls lb.	.22	.23	.22	.23	.21	.22
Phosphate, tech, 450 lb bbls lb.	.06½	.07½	.06½	.07½	.07½	.08
Resinate, precip, bbls lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls lb.	.19	.21	.19	.21	.18	.21
Camphor, slabs lb.	...	.55	...	.55	.50	.56
Powder lb.	...	.55	...	.55	.4940	.56
Camwood, Bk, ground bbls lb.	.16	.18	.16	.18	.16	.18
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05¼	.08
Black, c-l, bgs, delv, price varying with zone lb.	.0445	.0535	.0445	.0535	.0445	.0535
lcl, bgs, delv, all zones lb.	...	.07	...	.07	...	.07
cartons, delv lb.	...	.07¾	...	.07¾	...	.07¾
cases, delv lb.	...	.08¼	...	.08¼	...	.08¼
Decolorizing, drs, c-l lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 1400 lb drs, delv lb.	.05¼	.06	.05¼	.06	.05¼	.06
Casein, Standard, Dom, grd lb.	.13	.14	.13	.20¾	.14½	.20¾
80-100 mesh, c-l, bgs lb.	.13½	.14½	.13½	.21¼	.15	.21¼
Castor Pomace, 5½ NH_3, c-l, bgs, wks ton	...	25.00	23.00	25.00	15.00	20.00
Imported, ship, bgs ton	...	nom.	...	nom.	17.00	18.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.17	.18
Transparent, cs lb.	.12	.13	.12	.13	...	.20
Cellulose, Acetate, 50 lb kgs lb.	...	.40	.40	.55	.55	.60
Chalk, dropped, 175 lb bbls lb.	.03	.03¾	.03	.03¾	.03	.03¾
Precip, heavy, 560 lb cks lb.	.03	.04	.03	.04	.03	.04
Light, 250 lb cks lb.	.03¼	.04	.03	.04	.03	.04
Charcoal, Hardwood, lump, blk, wks bu.	...	.15	...	.15	...	.15
Softwood, bgs, delv* ton	23.00	34.00	23.00	34.40	23.00	34.00
Willow, powd, 100 lb bbl, wks lb.	.06	.07	.06	.07	.06	.06¼
Chestnut, clarified, tks, wks lb.	...	.02125	.01625	.02125	.01625	.01⅞
25%, bbls, wks lb.	...	.0225	.02	.0225	.01½	.02
Pwd, 60%, 100 lb bgs, wks lb.	...	.04⅞	...	.04⅞	...	.04⅞
China Clay, c-l, blk mines ton	...	6.50	...	6.50	...	7.00
Imported, lump, blk ton	22.00	25.00	22.00	25.00	15.00	25.00
Chlorine, cyls, lcl, wks, contract lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract lb. j	...	.05½	...	.05½	...	.05½
Liq, tk, wks, contract 100 lb.	...	2.15	...	2.15	...	2.15
Multi, c-l, cyls, wks, cont lb.	2.30	2.55	2.30	2.55	2.30	2.55
Chloroacetophenone, tins, wks lb.	3.00	3.50	3.00	3.50	...	3.00
Chlorobenzene, Mono, 100 lb drs, lcl, wks lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins lb.	.30	.31	.30	.31	.30	.31
Chloropicrin; comml cyls lb.	...	.80	...	.80	.85	.90
Chrome, Green, CP lb.	.21	.24	.20	.24	.21½	.23
Yellow lb.	.14½	.15½	.13	.16½	.11	.14
Chromium, Acetate, 8% Chrome, bbls lb.	.05	.08	.05	.08	.06	.08
20° soln, 400 lb bbls lb.	...	.05½	...	.05½	...	.05½
Fluoride, powd, 400 lb bbl lb.	.27	.28	.27	.28	.27	.28

j A delivered price; * Depends upon point of delivery.

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Coal tar, bbls ....bbl.	7.00	8.00	6.75	9.00	7.25	9.00
Cobalt Acetate, bbls ......lb.	.66	.68	.58	.68	.58	.60
Carbonate tech, bbls ....lb.	...	1.63	1.42¾	1.63	1.35	1.48
Hydrate, bbls ....lb.	...	1.78	1.60	1.78	1.66	1.76
Linoleate, solid, bbls ...lb.	...	.33	.31	.33	.30	.31¼
Oxide, black, bgs ......lb.	...	1.67	1.41	1.67	1.29	1.49
Resinate, fused, bbls ...lb.	...	.13½	.13	.13½	.12½	.13
Precipitated, bbls ....lb.	...	.34	.30½	.34	...	.32
Cochineal, gray or bk bgs..lb.	.32	.36	.32	.36	.32	.36
Teneriffe silver, bgs ....lb.	.33	.37	.33	.37	.33	.37
Copper, metal, electrol 100 lb.	...	14.00	13.00	16.25	9.50	12.00
Carbonate, 400 lb bbls ..lb.	.10½	.12½	.10½	.12½	...	.08¼
52-54% bbls ....lb.	...	.18	.16¼	.19	.14½	.16¼
Chloride, 250 lb bbls ...lb.	.15	.17	.15	.18	.17	.18
Cyanide, 100 lb drs ....lb.	.37	.38	.37	.38	.37	.38
Oleate, precip, bbls .....lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks..lb.	...	nom.	.17½	.18	.14½	.15¾
red 100 lb bbls ....lb.	...	nom.	.17	.18	.14	.15
Resinate, precip, bbls ...lb.	.15	.16	.15	.19	.18	.19
Stearate, precip, bbls ...lb.	.23	.24	.23	.40	.35	.40
Sub-acetate verdigris, 400 lb bbls ....lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	...	5.15	4.55	6.00	3.85	4.55
Copperas, crys and sugar bulk c-l, wks ....ton	12.00	13.00	12.00	13.00	13.00	16.00
Corn Sugar, tanners, bbls 100 lb.	...	4.34	3.74	4.34	3.08	4.03
Corn Syrup, 42°, bbls..100 lb.	...	4.36	3.76	4.36	3.05	3.95
43°, bbls ....100 lb.	...	4.41	3.86	4.41	3.10	4.05
Cotton, Soluble, wet, 100 lb bbls ....lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, USP, powd & gran, 300 lb bbls .....lb.	.18¾	.19¼	.15	.19¼	.15	.16¾
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1, tks ......gal.	.13½	.14	.13	.14	.12½	.13½
Grade 2 ....gal.	.118	.128	.113	.128	.109	.12
Cresol, USP, drs ....lb.	.12½	.13	.10	.13	.10	.10½
Crotonaldehyde, 98%, drs, wks ....lb.	.26	.30	.26	.30	.26	.30
Cutch, Philippine, 100 lb bale lb.	.04	.04¾	.04	.04¾	.04	.04¾
Cyanamid, bgs, c-l, frt allowed Ammonia unit	...	1.15	1.10	1.15	1.07½	1.10
Derris root 5% rotenone, bbls ....lb.	.39	.47	.39	.47	...	...
Dextrin, corn, 140 lb bgs f.o.b., Chicago ...100 lb.	4.80	5.00	4.35	5.00	3.45	5.00
British Gum, bgs ...100 lb.	5.15	5.25	4.60	5.25	3.70	5.40
Potato, Yellow, 220 lb bgs lb.	.07¾	.08¾	.07¾	.08¾	.07¾	.08¾
White, 220 lb bgs, lcl lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl ...lb.	...	.08	...	.08	...	.08
White, 140 lb bgs ..100 lb.	4.30	4.58	4.30	4.58	3.40	4.95
Diamylamine, c-l, drs, wks lb.	.47	.75	.47	.75	.75	1.00
Diamylene, drs, wks ......lb.	.095	.102	.095	.102	.095	.102
tks, wks ....lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs ....lb.	.085	.092	.085	.092	.085	.092
tks, wks ....lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks ..lb.	...	.30	...	.30	...	...
Diamylphthalate, drs, wks lb.	.20½	.21	.19	.21½	.18	.19½
Diamyl Sulfide, drs, wks ..lb.	...	1.10	...	1.10	...	1.10
Dianisidine, bbls ....lb.	2.25	2.45	2.25	2.45	2.25	2.45
Dibutoxy Ethyl Phthalate, drs, wks ....lb.	...	.35	...	.35	...	...
Dibutyl Ether, drs, wks, lcl lb.	...	.30	...	.30	...	...
Dibutylphthalate, drs, wks, frt allowed ....lb.	...	.21	.19½	.21	.18	.21
Dibutyltartrate, 50 gal drs lb.	.35	.40	.35	.50	.35	.40
Dichlorethylene, drs .....gal.	.29	...	.29	...	.29	...
Dichloroethylether, 50 gal drs, wks ....lb.	.15	.16	.15	.16	.16	.17
tks, wks ....lb.	...	.14	...	.14	...	.15
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	no prices		no prices		.032	.040
tks, wks ....lb.	no prices		no prices		...	.02½
Diethanolamine, tks, wks..lb.	...	.25	.25	.35	...	.30
Diethylamine, 400 lb drs ..lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs..lb.	.50	.52	.50	.52	.50	.55
Diethyl Carbinol, drs .....lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs lb.	.31⅜	.35	.31⅜	.35	.31⅜	.35
90% grade, drs ....lb.	...	.25	...	.25	...	.25
Diethylorthotoluidin, drs ..lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.18	.19½	.18	.19
Diethylsulfate, tech, drs, wks, lcl ....lb.	...	.20	...	.20	...	.20
Diethyleneglycol, drs .....lb.	.22	.23	.16½	.23	.15½	.17½
Mono ethyl ethers, drs..lb.	.16	.17	.16	.17	.15	.17
tks, wks ....lb.	...	.15	...	.15	...	.15
Mono butyl ether, drs ..lb.	...	.26	...	.26	...	.26
Diethylene oxide, 50 gal drs, wks ....lb.	.20	.24	.20	.24	.20	.24
Diglycol Oleate, bbls .....lb.	...	.21	.21	.24	...	.24
Laurate, bbls ....lb.	...	.27½	...	...	...	...
Stearate, bbls ....lb.	...	.27½	...	...	...	...
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis ....lb.	...	1.00	...	.95	...	.95
Dimethylaniline, 340 lb drs lb.	.26	.27	.26	.27	.26	.30
Dimethyl Ethyl Carbinol, drs lb	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed ....lb.	.	.21	.20½	.21	.19½	.21½
Dimethysulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. *k*	.16	.19	.16	.19	.16	.19½
Dinitrochlorobenzene, 400 lb bbls ....lb.	.16½	.17½	.16	.17½	.14	.15½
Dinitronaphthalene, 350 lb bbls ....lb.	.35	.38	.35	.38	.34	.37
Dinitrophenol, 350 lb bbls lb.	.23	.24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	.14½	.15½	.14½	.15½	.14½	.16½

k Higher price is for purified material.

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Diphenyl, bbls ... lb.	.15	.25	.15	.25	.15	.25
Diphenylamine ... lb.	.31	.32	.31	.32	.31	.32
Diphenylguanidine, 100 lb drs ... lb.	.35	.37	.35	.37	.35	.37
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	34.00	nom.	34.00	nom.	32.00	45.00
Extract ... lb.	.05	.05½	.05	.05½	.05	.05½
EGG YOLK						
Egg Yolk, dom., 200 lb cases lb.	.68	nom.	.68	nom.	.63	.68
Imported ... lb.	.54	.56	.53	.57	.48	.56
Epsom Salt, tech, 300 lb bbls						
c-l NY ... 100 lb.	1.90	2.10	1.80	2.10	1.80	2.00
USP, c-l, bbls ... 100 lb.	...	2.10	2.00	2.10	...	2.00
Ether, USP anaesthesia 55 lb drs ... lb.	.22	.23	.22	.23	.22	.23
(Conc) ... lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs ... lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed ... lb.	...	.06	...	.06	...	.06
Nitrous, conc, bottles ... lb.	...	.68	.68	.77	.75	.77
Synthetic, wks, drs ... lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester						
tks, frt alld ... lb.	...	.06½	...	.06½	.06½	.08
drs, frt alld ... lb.	...	.07½	...	.07½	.07½	.09
95%, tks, frt allowed .. lb.	...	.06¾	...	.06¾	.07	.08½
drs, frt alld ... lb.	...	.07¾	...	.07¾	.08	.10
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	.37	.68
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs ... lb.	.50	.55	.50	.55	.50	.55
Chloride, 200 lb drs ... lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys ... lb.	...	.30	...	.30	...	.30
Crotonate, drs ... lb.	1.00	1.25	1.00	1.25	1.00	1.25
Formate, drs, frt allowed lb.	.27	.28	.27	.31	...	...
Lactate, drs, wks ... lb.	...	.33	...	.33	.25	.29
Methyl Ketone, 50 gal drs,						
frt allowed ... lb.	.07	.07½	.07	.07½	.07	.09
tks, frt allowed ... lb.	...	.06½	...	.06½	.06½	.07½
Oxalate, drs, wks ... lb.	.30	.34	.30	.34	.37½	.55
Oxybutyrate, 50 gal drs, wks ... lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks ... lb.	...	.77	...	.77	...	...
Ethylene Dibromide, 60 lb drs ... lb.	.65	.70	.65	.70	.65	.70
Chloryhdrin, 40%, 10 gal						
cbys chloro, cont ... lb.	.75	.85	.75	.85	.75	.85
Anhydrous ... lb.		.75		.75	...	.75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks lb.	.17	.21	.17	.21	.17	.21
tks, wks ... lb.	...	.16	...	.16	...	.16
Mono Butyl Ether, drs,						
wks ... lb.	.20	.21	.20	.21	.20	.21
tks, wks ... lb.	...	.19	...	.19	...	.19
Mono Ethyl Ether, drs,						
wks ... lb.	.16	.17	.16	.17	.16	.17
tks, wks ... lb.	...	.15	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks ... lb.	...	.14	...	.14	.14	.18½
tks, wks ... lb.	...	.13	...	.13	.13	.16½
Mono, Methyl Ether, drs						
wks ... lb.	.18	.22	.18	.22	.19	.23
tks, wks ... lb.	...	.17	...	.17	...	.18
Oxide, cyl ... lb.	.50	.55	.50	.55	.50	.60
Ethylidenaniline ... lb.	.45	.47½	.45	.47½	.45	.47½
Feldspar, blk pottery ... ton	...	14.50	...	14.50	...	14.50
Powd, blk, wks ... ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys,						
475 lb bbls ... lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys ... lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground, wks ... unit *l*	...	4.00	3.75	4.25	2.50	3.50
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis ... unit *m*	...	3.10	3.10	3.15	...	2.25
Fluorspar, 98%, bgs ... lb.	no prices		no prices		30.00	35.50
Formaldehyde, USP, 400 lb						
bbls, wks ... lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.07
Fossil Flour ... lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines .. ton	6.50	15.00	6.50	15.00	6.50	15.00
Imp powd, c-l, bgs ... ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks .. lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb drs ... lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.16	.18	.16	.18	.16	.18
Fustic, crystals, 100 lb						
boxes ... lb.	.22	.26	.20	.26	.20	.23
Liquid 50°, 600 lb bbls .. lb.	.09½	.13	.08½	.13	.08½	.12
Solid, 50 lb boxes ... lb.	.17½	.19½	.16	.19½	.16	.18
G SALT PASTE						
G Salt paste, 360 lb bbls ... lb.	.45	.47	.45	.47	.45	.47
Gall Extract ... lb.	.19	.20	.19	.20	.18	.20
Gambier, com 200 lb bgs .. lb.	...	nom.	...	nom.	...	.06
Singapore cubes, 150 lb bgs ... 100 lb.	...	.10½	.09½	.10½	.08	.09
Gelatin, tech, 100 lb cs ... lb.	.50	.55	.50	.55	.50	.55
Glauber's Salt, tech, c-l, bgs, wks* ... 100 lb.	.95	1.15	.95	1.15	.95	1.30
Anhydrous, see Sodium Sulfate.						
Glue, bone, com grades, c-l						
bgs ... lb.	.11	.17½	.11	.17½	.10½	.17½
Better grades, c-l, bgs lb.	.12½	.17½	.12½	.17½	.12	.17½
Casein, kgs ... lb.	.18	.22	.18	.22	.18	.22

l + 10; *m* + 50; *Bbls. are 20c higher.

Current

Glycerin
Gum, Hemlock

		Current Market		1937		1936	
				Low	High	Low	High
Glycerin, CP, 550 lb drs	lb.	.21½	.22	.21½	.29	.16	.21½
Dynamite, 100 lb drs	lb.	.21½	.22	.21½	.29	.13¾	.21½
Saponification, drs	lb.	.15½	.16	.15½	.29	.10¼	.22
Soap Lye, drs	lb.	.14	.14½	.14	.27	.09¼	.20
Glyceryl Bori-Borate, bbls	lb.	...	.40	...	...	...	...
Monoricinoleate, bbls	lb.	...	.27	...	...	...	...
Monostearate, bbls	lb.	...	.30	...	...	...	...
Oleate, bbls	lb.	...	.22	...	...	...	...
Phthalate	lb.	...	.37	.29	.37	.28	.29
Glyceryl Stearate, bbls	lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls	lb.	...	.26	...	...	...	...
Phthalate, drs	lb.	...	.40	.29	.40	.29	.35
Stearate, drs	lb.	...	.27½	.23	.27½	...	.23
GUMS							
Gum Aloes, Barbadoes	lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.14½	.15	.10½	.15½	.09	.10¾
White sorts, No. 1, bgs	lb.	.29	.30	.27	.30	.25	.28
No. 2, bgs	lb.	.27	.28	.25	.28	.24	.26
Powd, bbls	lb.	.17	.19	.14	.19	.13	.14
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b., NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b., NY	lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases	lb.	.16	.17	.16	.19	.15	.19
Copal, Congo, 112 lb bgs, clean, opaque	lb.	...	.19¼	.18⅞	.19¼	.18½	.20
Dark amber	lb.	...	.08¼	.06⅞	.08¼	.06⅞	.08
Light amber	lb.	...	.13⅛	.10¼	.13⅛	.10¼	.14⅛
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	...	.13	...	.13	.12⅝	.14
Chips	lb.	...	.06½	...	.06½	.06⅛	.06½
Dust	lb.	.03⅝	.04⅛	.03⅝	.04⅛	.03⅝	.04⅛
Nubs	lb.	...	.11¼	...	.11¼	.10⅜	.11⅛
Singapore, Bold	lb.	...	.15⅝	...	.15⅝	.15⅛	.16⅞
Chips	lb.	...	.04¾	.04¼	.05	.04⅜	.05¼
Dust	lb.	.03⅝	.04⅛	.03⅝	.04⅛	.03⅝	.04⅛
Nubs	lb.	...	.10⅜	.10⅜	.10¾	.10	.11¼
Copal Manilla, 180-190 lb baskets, Loba A	lb.	...	.10⅛	.09¾	.10⅛	.09¼	.13
Loba B	lb.	...	.09¾	.09¼	.09¾	.08⅞	.12
Loba C	lb.	...	.09⅜	.08⅞	.09⅜	.08⅜	.11⅛
DBB	lb.	...	.08⅜	.08	.08⅜	.07⅝	.08⅞
Dust	lb.	...	.06⅛	.05¾	.06⅛	.05	.06⅛
MA sorts	lb.	...	.07¼	.06¾	.07¼	.06¾	.07⅝
Copal Pontianak, 224 lb cases, bold genuine	lb.	...	.16	.15½	.16	.14¼	.16
Chips	lb.	...	.10¼	.09⅛	.11⅛	.07	.08½
Mixed	lb.	...	.14	.13½	.14	.13¼	.13¾
Nubs	lb.	...	.12⅞	.12¾	.13½	.10¼	.12
Split	lb.	...	.15¼	.13½	.15¼	.12¾	.13
Dammar Batavia, 136 lb cases							
A	lb.	...	.23½	...	.23½	.21⅜	.22¼
B	lb.	...	.22⅛	...	.22⅛	.20⅜	.21½
C	lb.	...	.18½	...	.18½	.16½	.17⅝
D	lb.	...	.15¼	.15¼	.15⅝	.13⅝	.14⅜
A/D	lb.	...	.18⅛	.17⅝	.18½	.15½	.17⅛
A/E	lb.	...	.15¾	.14⅞	.15¾	.12⅞	.14½
E	lb.	...	.08⅛	.07½	.08⅛	.06¾	.07⅛
F	lb.	...	.06¾	.06¼	.06¾	.05⅞	.06⅞
Singapore, No. 1	lb.	...	.20⅝	.17⅛	.20⅝	.16¼	.17½
No. 2	lb.	...	.15⅞	.14⅛	.15⅞	.13	.14¼
No. 3	lb.	...	.05¾	...	.05¾	.05¼	.05¾
Chips	lb.	...	.12	.10¼	.12	.09¾	.09¾
Dust	lb.	...	.05¾	.05¾	.06	.04¼	.05⅝
Seeds	lb.	...	.09½	.07⅞	.09½	.06⅝	.07⅜
Elemi, cons	lb.	.09⅜	.09½	.09⅜	.10¼	.09¾	.10¼
Ester	lb.	.10	.10½	.10	.12	.07⅝	.10
Gamboge, pipe, cases	lb.	.58	.59	.58	.59	.58	.59
Powd, bbls	lb.	.65	.66	.65	.66	.65	.66
Ghatti, sol. bgs	lb.	.11	.15	.11	.15	.11	.15
Karaya, powd, bbls, xxx	lb.	.27	.30	.24	.30	.24	.25
xx	lb.	.18	.19	.16	.19	.16	.17
No. 1	lb.	.12	.13	.09½	.13	.09½	.10
No. 2	lb.	.11	.12	.08½	.12	.08½	.09
Kauri, NY, San Francisco, Brown XXX, cases	lb.	.60	.60½	.60	.60½	.60	.60½
BX	lb.	...	.38	.33	.38	.33	.33½
B1	lb.	...	.28	.21	.28	.19	.21
B2	lb.	...	.26	.15½	.26	.14½	.15½
B3	lb.	...	.18½	.12	.18½	.12	.12½
Pale XXX	lb.	...	.61	.61	.65½	.65	.65½
No. 1	lb.	...	.41	.40	.41	.40	.40½
No. 2	lb.	...	.24	.22	.24	.22	.22½
No. 3	lb.	...	.17¾	.15	.17¾	.15	.15½
Kino, tins	lb.	1.60	1.70	.70	1.70	.70	.80
Mastic	lb.	.57	.58	.57	.58	.56	.60½
Sandarac, prime quality, 200 lb bgs & 300 lb cks	lb.	.33	.35	.33	.35	.19½	.38
Senegal, picked bgs	lb.	.27	.29	.20	.29	.20	.21
Sorts	lb.	.14½	.15	.09¾	.15	.09¾	.12½
Thus, bbls	280 lbs.	...	13.75	12.00	13.75	11.00	12.00
Strained	280 lbs.	...	13.75	12.00	13.75	11.00	12.00
Tragacanth, No. 1, cases	lb.	2.75	3.00	2.40	3.25	1.20	2.50
No. 2	lb.	2.40	2.75	2.00	2.75	1.10	2.10
No. 3	lb.	2.35	2.70	1.95	2.70	.95	2.05
No. 4	lb.	2.30	2.65	1.85	2.65	.85	1.95
No. 5	lb.	2.25	2.50	1.65	2.50	.75	1.75
Yacca, bgs	lb.	...	.04½	.03¼	.04½	.03¼	.03¾
Helium, cyl (200 cu. ft.)	cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18	.34	.16	.34	.16	.34
Hemlock, 25%, 600 lb bbls, wks	lb.	.03	.03¼	.03	.03¼	...	.02⅞
tks	lb.	...	.02¾	...	.02¾	...	.02½

	Current Market	1937 Low	1937 High	1936 Low	1936 High
Hexalene, 50 gal drs, wks lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks gal.	...	.10½	...	.10½	...	.12
Hexamethylenetetramine, powd, drs lb.	.35	.36	.35	.36	.35	.39
Hexyl Acetate, secondary, delv, drs lb.	.13	.13½	.13	.13½	.13	.13½
tks lb.	...	.12	...	.12	...	.11½
Hoof Meal, f.o.b. Chicago unit	...	3.50	3.50	3.75	2.35	3.00
Hydrogen Peroxide, 100 vol, 140 lb cbys lb.	.20	.21	.20	.21	.20	.21
Hydroxyamine Hydrochloride lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	.16	.21	.15	.21	.17	.20
INDIGO					
Indigo, Bengal, bbls lb.	...	2.40	...	2.40	...	...
Synthetic, liquid lb.	.16½	.19	.16½	.19	.13	.14
Iodine, Resublimed, kgs lb.	1.50	1.60	1.50	1.60	1.50	1.75
Irish Moss, ord, bales lb.	.11	.12	.11	.12	.09	.10
Bleached, prime, bales lb.	.19	.20	.19	.21	.18	.19
Iron Acetate Liq. 17°, bbls lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.						
Nitrate, coml, bbls 100 lb.	2.32	3.11	2.32	3.25	2.75	3.25
Isobutyl Carbinol (128-132°C) drs, wks lb.	.33	.34	.33	.34	.33	.34
tks, wks lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt allowed lb.	...	.06½	...	.06½	.06	.07½
drs, frt allowed lb.	.07½	.08	.07½	.08	.07	.09
Ether, see Ether, isopropyl.						
Keiselguhr, 95 lb bgs, NY, Brown ton	60.00	70.00	60.00	70.00	60.00	70.00
LEAD ACETATE					
Lead Acetate, f.o.b. NY, bbls, White, broken lb.	...	.13½	.11½	.13½	.11	.11½
cryst, bbls lb.	...	.13½	.11½	.13½	.10½	.11½
gran, bbls lb.	...	.14¼	.12¼	.14¼	.11	.12¼
powd, bbls lb.	...	.14¼	.12¼	.14¼	.11¼	.12¼
Arsenate, East, drs lb.	.11½	.12	.11	.12	.09	.10
West, drs lb.	.11½	.12	.11	.12½	.09	.09¾
Linoleate, solid, bbls lb.	...	.19	.18	.19	.18	.26½
Metal, c-l, NY 100 lb.	...	6.00	6.00	7.05	4.50	6.00
Nitrate, 500 lb bbls, wks lb.	.11	.11½	.09	.11½	.09	.09½
Oleate, bbls lb.	.18½	.20	.15	.20	.15	.16
Red, dry, 95% Pb_3O_4, delv lb.	...	.08½	.08½	.0945	.07	.085
97% Pb_3O_4, delv lb.	...	.09¼	.08¾	.09¾	.07¼	.08¾
98% Pb_3O_4, delv lb.	...	.09½	.09	.10	.07½	.09
Resinate, precip, bbls lb.	...	.16½	.14	.16½	...	.14
Stearate, bbls lb.	.22	.23	.22	.23	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt allowed lb.	...	.12	.10	.12	...	...
White, 500 lb bbls, wks lb.	...	.07½	.07¼	.09	.06½	.07¼
Basic sulfate, 500 lb bbls, wks lb.	...	.07	.06¾	.08¾	.06	.06½
Lime, chemical quicklime, f.o.b., wks, bulk ton	6.00	8.00	6.00	8.00	7.00	7.25
Hydrated, f.o.b., wks ton	8.00	12.00	8.00	12.00	8.50	12.00
Lime Salts, see Calcium Salts.						
Lime sulfur, dealers, tks gal.	...	.11	...	.11	...	.11
drs gal.	.13	.16	.13	.16	.13	.16
Linseed Meal, bgs ton	...	35.00	35.00	42.50	29.00	40.50
Litharge, coml, delv, bbls lb.	...	.07½	.07½	.08½	.06	.075
Lithopone, dom, ordinary, delv, bgs lb.	.04⅜	.04⅝	.04¼	.04⅝	.04¼	.04¾
bbls lb.	.04⅝	.04⅞	.04½	.04⅞	.04½	.05
High strength, bgs lb.	.05⅞	.06⅛	.05¾	.06⅛	.05¾	.06¼
bbls lb.	.06⅛	.06⅜	.06	.06⅜	.06	.06½
Titanated, bgs lb.	.05⅞	.06⅛	.05¾	.06⅛	.05¾	.06¼
bbls lb.	.06⅛	.06⅜	.06	.06⅜	.06	.06½
Logwood, 51°, 600 lb bbls lb.	.09½	.11½	.08½	.11½	.06½	.10½
Solid, 50 lb boxes lb.	.15	.19	.15	.17½	.13½	.17½
Sticks ton	24.00	25.00	24.00	25.00	24.00	26.00
MADDER					
Madder, Dutch lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbl ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks lb.	.06¼	.07	.06	.07	.06	.06½
Chloride flake, 375 lb drs, c-l, wks ton	39.00	42.00	39.00	42.00	36.00	42.00
Fluosilicate, crys, 400 lb bbls, wks lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, USP, light, 100 lb bbls lb.	.36	.40	.36	.40	...	.42
Heavy, 250 lb bbls lb.	...	.50	...	.50	...	.50
Palmitate, bbls lb.	.33	nom.	.33	nom.	.23	.24
Silicofluoride, bbls lb.	.09½	.10½	.09½	.10½	...	...
Stearate, bbls lb.	.21	.24	.21	.24	.20	.24
Manganese acetate, drs lb.	...	.26½	.25½	.26½	...	...
Borate, 30%, 200 lb bbls lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks lb.	.09	.12	.09	.12	.09	.12
Dioxide, tech (peroxide), paper bgs, c-l ton	...	47.50	...	47.50	...	47.50
Hydrate, bbls lb.	...	.32	...	.32	...	...
Linoleate, liq, drs lb.	.18	.19¼	.18	.19¼	...	...
solid, precip, bbls lb.	...	.19	.17½	.19	...	...
Resinate, fused, bbls lb.	.08¼	.08½	.08¼	.08½	...	...
precip, drs lb.	...	.12	...	.12	...	...
Sulfate, tech, anhyd, 90-95%, 550 lb drs lb.	.07	.07½	.07	.07½	...	...
Mangrove, 55%, 400 lb bbls lb.	...	.04	...	.04	...	.04
Bark, African ton	25.50	26.00	25.50	27.00	25.50	27.00

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Mannitol, pure **cryst, cs, wks lb.**	...	1.48	...	1.48	1.48	1.60
Marble Flour, blk ...... ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride (Calomel) lb.	1.59	1.60	1.05	1.60	.81	1.20
Mercury metal ...**76 lb. flasks**	97.50	99.00	92.00	99.00	73.50	95.00
Meta-nitro-aniline .... lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ....lb.	1.45	1.55	1.45	1.55	1.40	1.55
Meta-phenylene-diamine 300 lb bbls ....lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine, 300 lb bbls ....lb.	.65	.67	.65	.67	.65	.69
Methanol, denat. grd, drs, c-l, frt all'd ....**gal.**	...	.44	.44	.53	...	...
tanks, frt all'd ....**gal.**	...	.38	.38	.48	...	...
Pure, drs, c-l, frt all'd **gal.**	...	.38	...	.38	...	...
tanks ....**gal.**	...	.33	...	.33	...	...
95%, tks ....**gal.**	...	.31	...	.31	...	...
97%, tks ....**gal.**	...	.32	...	.32	...	...
Methyl Acetate, dom, 98-100%, drs ....lb.	.16	.17½	.16	.17½	.11	.18½
Acetone, frt all'd, drs **gal.** *p*	.42	.48	.42	.58½	.45½	.68½
tks, frt allowed, drs **gal.** *p*	.36	.40	.36	.44½	.41	.48
Synthetic, frt all'd, east of Rock M., drs ....**gal.** *p*	.52½	.59½	.52½	.59½	.52½	.60
tks, frt all'd ....**gal.**	.48	.49½	.48	.49½	.48	.53
West of Rocky M., frt all'd, drs ..**gal.** *p*	.55½	.58	.55½	.58	.55½	.69
tks, frt all'd ..**gal.** *p*	...	.51	...	.51	.51	.63½
Anthraquinone ....lb.	.65	.67	.65	.67	.65	.67
Butyl Ketone, tks ......lb.	.	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl .....lb.	.32	.40	.32	.43	...	.45
Ethyl Ketone, tks ......lb.	.	.07½	.	.07½	...	.07½
Formate, drs, frt allowed lb.	.35	.36	.35	.39	...	...
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt allowed lb.	...	.30	...	.30	...	...
Propyl carbinol, drs ....lb.	.60	.75	.60	.75	.60	.75
Mica, dry grd, bgs, wks ..lb.	35.00	...	35.00	...	35.00	...
Michler's Ketone, kgs ....lb.	...	2.50	...	2.50	...	2.50
Molasses, blackstrap, tks, f.o.b. NY ....gal.	...	.07¼	...	.07¼	.07	.08¼
Monoamylamine, c-l, drs, wks lb.	.52	1.00	.52	1.00	...	1.00
Monochlorobenzene, see Chlorobenzene, mono.						
Monoethanolamine, tks, wks lb.	...	.25	.25	.30	...	.30
Monomethylamine, drs, frt all'd, E. Mississippi, c-l ..lb.	...	.65	...	.65	...	...
Monomethylparaminosulfate, 100 lb drs ....lb.	3.75	4.00	3.75	4.00	3.75	4.00
Myrobalans 25%, liq bbls ..lb.	...	.04¼	...	.04¼	...	.04¼
50% Solid, 50 lb boxes lb.	.06	.06¼	.06	.06¼	.06	.06¼
J1 bgs ....ton	...	29.50	26.50	29.50	22.00	26.50
J2 bgs ....ton	...	20.75	19.00	20.75	14.25	16.75
R2 bgs ....ton	...	20.25	18.75	20.25	14.00	16.25

NAPHTHA

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks ....gal.	...	.31	...	.31	...	.31
drs, c-l ....gal.	...	.36	...	.36	...	.36

NAPHTHALENE

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Naphthalene, dom, crude, bgs, wks ....lb.	2.00	2.25	2.00	3.00	2.75	4.50
Imported, cif, bgs ....lb.	2.00	2.25	2.25	3.00	...	...
Balls, flakes, pks ......lb.	...	.08	...	.08	.07¼	.08
Balls, ref'd, bbls, wks ..lb.	...	.07¼	...	.07¼	.06¾	.07¼
Flakes, ref'd, bbls, wks ..lb.	...	.07¼	...	.07¼	.06¾	.07¼
Nickel Carbonate, bbls....lb.	.36	.37½	.36	.37½	...	.36
Chloride, bbls ....lb.	.18	.20	.18	.20	.18	.19
Metal ingot ....lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY ..lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY ...lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ....lb.	...	.76	...	.76	.75	1.17
Nitre Cake, blk ....ton	...	16.00	...	16.00	12.00	14.00
Nitrobenzene, redistilled, 1000 lb drs, wks ....lb.	.08	.10	.08	.10	.08	.11
tks ....lb.	...	.07½	...	.07½	...	.08½
Nitrocellulose, c-l-l c-l, wks lb.	.22	.29	.26	.29	.26	.34
Nitrogenous Mat'l, bgs, imp unit	...	3.35	3.35	3.55	2.00	3.10
dom, Eastern wks ....unit	...	3.40	3.60	4.25	1.90	3.00
dom, Western wks ....unit	...	3.15	3.15	3.75	1.85	2.75
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs .....lb.	.20	.22	.20	.22	.16	.18
Chinese, bgs ....lb.	.20	.22	.20	.22	.19	.20

OAK BARK

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Oak Bark Extract, 25%, bbls lb.	...	.03⅛	...	.03⅛	...	.03½
tks ....lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ...lb.	.16	.17	.16	.17	...	.15
Orange-Mineral, 1100 lb cks NY ....lb.	...	.11½	.11¼	.12¾	.10	.11¼
Orthoaminophenol, 50 lb kgs .lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.82	.84
Orthochlorophenol, drs ....lb.	.35	.75	.35	.75	.50	.65
Orthocresol, drs, wks .....lb.	.13½	.14½	.13½	.14½	.13	.15
Orthodichlorobenzene, 1000 lb drs ....lb.	.06	.07	.05	.07	.05	.11½

o Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila. or N. Y.

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Orthonitrochlorobenzene, 1200 lb drs, wks ....lb.	.28	.29	.28	.29	.28	.29
Orthonitroparachlorphenol, tins ....lb.	.70	.75	.70	.75	.70	.75
Orthonitrophenol, 350 lb drs ....lb.	.85	.90	.85	.90	.52	.80
Orthonitrotoluene, 1000 lb drs, wks ....lb.	.07	.10	.07	.10	.07	.10
Orthotoluidine, 350 lb bbls, l-c-l ....lb.	.16	.17	.14	.17	.14	.15
Osage Orange, cryst, bbls ..lb.	.17	.25	.17	.25	.17	.25
51° liquid ....lb.	.07	.08	.07	.08	.07	.07¼
Paraffin, rfd, 200 lb cs slabs						
122-127° M P ....lb.	.0445	.04½	.0445	.04½	.0445	.04½
128-132° M P ....lb.	.04¾	.049	.04¾	.049	.04¾	.049
133-137° M P ....lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
Para aldehyde, 110-55 gal drs ....lb.	.16	.18	.16	.18	.16	.18
Aminoacetanilid, 100 lb kgs ....lb.	...	.85	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs ......lb.	.30	.45	.30	.45	.50	.65
Dichlorobenzene, 200 lb drs, wks ....lb.	.16	.18	.16	.20	.16	.20
Formaldehyde, drs, wks ..lb.	.34	.35	.34	.35	.34	.39
Nitroacetanilid, 300 lb bbls ....lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks ....lb.	.45	.47	.45	.47	.47	.51
Nitrochlorobenzene, 1200 lb drs, wks ....lb.	.23½	.24	.23½	.24	.23½	.24
Nitro-orthotoluidine, 300 lb bbls ....lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.45	.50
Nitrosodimethylaniline, 120 lb bbls ....lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	.35	...	.35	.36	.37
Para Tertiary amyl phenol, wks, drs, c-l ....lb.	...	.26	...	.26	.26	.50
Phenylenedamine, 350 lb bbls ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls ....lb.	.70	.75	.70	.75	.70	.75
tks, wks ....lb.	...	.31	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks ....lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ....lb.	.56	.58	.56	.58	.56	.60
Paris Green, dealer, drs, frt E. of Cleveland ....lb.	.22	.24	.22	.24	...	.24
Pentane, normal, 28-38° C, group 3, tks ....gal.	...	.08½	.08½	.09½	.09	.09½
drs, group 3 ....gal.	.14	.16	.12½	.16	.10	.16
Perchlorethylene, 100 lb drs, frt allowed ....lb.	...	.10½	...	.10½	.10½	.15
Petrolatum, dark amber, bbls ....lb.	.02⅞	.03	.02⅝	.03	.02⅝	.02⅞
Light, bbls ....lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls ....lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls ....lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls ....lb.	.02⅝	.03¾	.02⅛	.03¾	.02⅛	.02⅝
White, lily, bbls ....lb.	.06	.06¼	.06	.06¼	.06	.06¼
White, snow, bbls ....lb.	.07	.07¼	.07	.07¼	.07	.07¼
Petroleum Ether, 30-60°, group, 3 tks ....gal.	...	.13	...	.13	...	.13
drs, group 3 ....gal.	.14	.17	.15	.17	.15	.16

PETROLEUM SOLVENTS AND DILUENTS

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Cleaners naphthas, group 3, tks, wks ....gal.	.07⅜	.07⅞	.07⅜	.07⅞	.07⅜	.07½
Bayonne, tks, wks ..gal.	...	.10	.09½	.10	.09	.09½
West Coast, tks ..gal.	...	.15	...	.15	...	.15
Hydrogenated, naphthas, frt allowed East, tks ...gal.	...	.16	...	.16	.15	.16
No. 2, tks ....gal.	...	.18	...	.18	...	.18
No. 3, tks ....gal.	...	.16	...	.16	...	.15
No. 4, tks ....gal.	...	.18	...	.18	...	.18
Lacquer diluents, tks						
Bayonne ....gal.	.12	.12½	.12	.12½	.12	.12½
Group 3, tks ....gal.	.08⅜	.08⅞	.08⅜	.08⅞	.07⅞	.08½
Naphtha, V.M.P., East, tks, wks ....gal.	...	.11	.10	.11	.09	.10
Group 3, tks, wks ...gal.	.07⅜	.07⅞	.07⅜	.07⅞	.07⅜	.07½
Petroleum thinner, East, tks, wks ....gal.	...	.10	.09	.10	.09	.09½
Group 3, tks, wks ...gal.	.06⅜	.06⅞	.06⅜	.06⅞	.06⅜	.06⅝
Rubber Solvents, stand grd, East, tks, wks ......gal.	...	.10	.09½	.10	.09	.09½
Group 3, tks, wks ...gal.	.07⅜	.07⅞	.07⅜	.07⅞	.07⅜	.07½
Stoddard Solvent, East, tks, wks ....gal.	...	.10	.09½	.10	.09	.09½
Group 3, tks, wks ...gal.	.06⅞	.07⅜	.06⅞	.07⅜	.06⅞	.07
Phenol, 250-100 lb drs ....lb.	.13¼	.15	.13¼	.15	.13¼	.15
tks, wks ....lb.	...	.12¾	...	.12¾	...	...
Phenyl-Alpha-Naphthylamine, 100 lb kgs ....lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs .....lb.	...	.17	.16	.17	...	.16
Phenylhydrazine Hydrochloride, com ....lb.	2.30	6.50	2.30	6.50	2.90	3.00
Phloroglucinol, tech, tins ..lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins ....lb.	20.00	22.00	20.00	22.00	20.00	22.00

Current

Phosphate Rock
Rosin Oil

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	...	1.85	...	1.85	...	1.85
70% basis ....ton	...	2.35	...	2.35	...	2.35
72% basis ....ton	...	2.85	...	2.85	...	2.85
75-74% basis ....ton	...	3.85	...	3.85	...	3.85
75% basis ....ton	...	5.50	...	5.50	...	4.35
Tennessee, 72% basis..ton	...	4.50	...	4.50	...	4.50
Phosphorus Oxychloride 175 lb cyl ....lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases ......lb.	.40	.44	.40	.44	.40	.45
Sesquisulfide, 100 lb cs..lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl ....lb.	.15	.18	.15	.20	.16	.20
Yellow, 110 lb cs, wks..lb.	.24	.30	.24	.33	.28	.33
Phthalic Anhydride, 100 lb drs, wks ....lb.	.14½	nom.	.14½	.15½	.14½	.15½
Pine Oil, 55 gal drs or bbls						
Destructive dist ....lb.	...	.65	.49	.65	.44	.50
Steam dist wat wh bbls gal.	...	.79	.64	.79	.64	.65
tks ....gal.	...	.74	.59	.74	...	.59
Pitch Hardwood, wks ....ton	16.00	16.50	15.00	16.50	...	15.00
Coaltar, bbls, wks .....ton	.	19.00	...	19.00	...	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.03½	.06½	...	.03½
Imported ....lb.	.11½	.12½	.11	.13	.11	.13
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls ....bbl.	6.00	6.50	6.00	6.50	4.00	5.25
Stearin, drs ....lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd ....oz.	56.00	66.00	45.00	68.00	34.50	64.00

POTASH

Potash, Caustic, wks, sol..lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake ....lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks ....lb.	...	.02⅞	...	.02⅞	...	.02⅞
Manure Salts, imported 30% basis, blk ...unit	...	.58½	.55	.58½	...	...
Potassium Abietate, bbls ..lb.	...	.13	...	...	...	...
Acetate ....lb.	.26	.28	.26	.28	.26	.28
Bicarbonate, USP, 320 lb bbls ....lb.	.09	.18	.09	.18	.09	.18
Bichromate Crystals, 725 lb cks* ....lb.	.08½	.09	.08½	.09	.08½	.09
Binoxalate, 300 lb bbls..lb.	...	.23	...	.23	...	.23
Bisulfate, 100 lb kgs ...lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks ....lb.	.06½	.07	.06½	.07	.06½	.07½
liquid, tks ....lb.	...	.02¾	...	.02¾	.02¾	.02⅞
drs, wks ....lb.	.02⅞	.03½	.02⅞	.03½	.02⅞	.03¼
Chlorate crys, 112 lb kgs, wks ....lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs ....lb.	.12	.13	.12	.13	.12	.13
powd, kgs ....lb.	.08½	.08¾	.08½	.08¾	.08	.08¼
Chloride, crys, bbls ....lb.	.04	.04¾	.04	.04¾	.04	.04¼
Chromate, kgs ....lb.	.28	.29	.28	.29	.23	.28
Cyanide, 110 lb cases ..lb.	.55	.57½	.55	.57½	.55	.57½
Iodide, 75 lb bbls ......lb.	.93	1.00	.93	1.15	1.10	1.25
Metabisulfite, 300 lb bbls lb.	.11	.12	.11	.15	.13¾	.15
Muriate, bgs, dom, blk unit	...	.53½	.50	.53½	.45	.50
Oxalate, bbls ....lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks ...lb.	.09	.11	.09	.11	.09	.11
Permanganate, USP, crys, 500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls .....lb.	.35	.37	.35	.37	.35	.38½
Yellow, bbls ....lb.	.15	.16	.15	.18	.16	.19
Sulfate, 90% basis, bgs ton	...	36.25	...	36.25	33.75	36.25
Titanium Oxalate, 200 lb bbls ....lb.	.33	.35	.33	.35	.32	.35
Pot & Mag Sulfate, 48% basis bgs ....ton	...	25.75	24.75	25.75	22.25	24.75
Propane, group 3, tks ....lb.	.03	.04⅛	.03	.04⅛	.03	.04⅛
Putty, coml, tubs .....100 lb.	...	2.90	2.90	3.00	2.75	3.00
Linseed Oil, kgs ...100 lb.	...	4.65	4.65	4.75	4.50	4.75
Pyrethrum, conc liq:						
2.4% pyretherins, drs, frt allowed ....gal.	4.25	4.50	4.15	4.50	...	...
3.6% pyretherins, drs, frt allowed ....gal.	6.37	6.75	6.10	6.75	...	...
Flowers, coarse, Japan, bgs ....lb.	...	.14¾	.12¾	.14¾	...	...
Fine powd, bbls ......lb.	...	.17¾	.14	.17¾	...	...
Pyridine, denat, 50 gal drs gal.	...	1.55	1.30	1.55	...	1.30
Pyrites, Spanish cif Atlantic ports, blk ....unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Quebracho, 35% liq tks ...lb.	...	.03	.02⅞	.03	.02⅝	.02⅞
450 lb bbls, c-l ....lb.	...	.03½	.03½	.03⅞	.03⅝	.03⅞
Solid, 63%, 100 lb bales cif ....lb.	...	.04	.03⅞	.04	.03⅝	.03⅞
Clarified, 64%, bales..lb.	...	.04¼	.04¼	.04⅜	.03⅞	.04⅜
Quercitron, 51 deg liq, 450 lb bbls ....lb.	.06	.06½	.06	.06½	.06	.06½
Solid, drs ....lb.	.10	.12	.10	.12	.10	.12

R SALT

R Salt, 250 lb bbls, wks ..lb.	.52	.55	.52	.55	.52	.57
Resorcinol tech, cans .....lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst ......lb.	.16	.16½	.14½	.16½	.14	.15
Powd, bbls ....lb.	.15	.15½	.13½	.15½	.13	.14
Rosin Oil, bbls, first run gal.	.58	.60	.58	.73	.38	.71
Second run ....gal.	.60	.62	.60	.75	.43	.73
Third run, drs ....gal.	.64	.66	.64	.79	.49	.77

* Spot price is ⅛c higher.

	Current Market	1937 Low	1937 High	1936 Low	1936 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:					
B	...	9.35	8.30	10.00	4.45	10.95
D	...	9.40	8.35	10.35	4.95	10.95
E	...	9.40	8.80	10.25	5.15	10.95
F	...	9.42½	9.30	10.80	5.40	10.95
G	...	9.42½	9.30	10.85	5.50	10.95
H	...	9.42½	9.30	10.85	5.60	10.95
I	...	9.42½	9.32½	10.90	5.70	10.95
K	...	9.45½	9.32½	10.90	5.55	10.95
M	...	9.45	9.32½	11.00	5.60	10.95
N	...	9.45	9.32½	11.05	5.70	11.00
WG	...	9.50	9.35	11.75	5.85	11.00
WW	...	10.35	10.00	13.75	5.90	12.05
Rosins, Gum, Savannah (280 lb unit):					
B	...	8.10	7.05	8.75	3.15	9.70
D	...	8.15	7.10	9.00	3.75	9.70
E	...	8.15	7.55	9.10	3.90	9.70
F	...	8.17½	8.05	9.55	4.10	9.70
G	...	8.17½	8.05	9.60	4.20	9.70
H	...	8.17½	8.05	9.60	4.30	9.70
I	...	8.17½	8.07½	9.65	4.35	9.70
K	...	8.20	8.07½	9.65	4.30	9.70
M	...	8.20	8.07½	9.75	4.35	9.70
N	...	8.20	8.07½	9.75	4.45	9.75
WG	...	8.25	8.10	10.50	4.45	9.75
WW	...	9.10	8.75	12.50	4.55	10.80
X	...	9.10	8.75	12.50	4.55	10.80
Rosin, Wood, c-l, FF grade, NY	8.76	9.85	8.76	10.72	6.10	10.52
Rotten Stone, bgs mines..ton	...	35.00	...	35.00	...	35.00
Imported, lump, bbls ...lb.	...	.12	...	...	...	...
Powdered, bbls ....lb.	.08½	.10	...	...	...	...

SAGO FLOUR

Sago Flour, 150 lb bgs ...lb.	.03¼	.03¾	.02¾	.03¾	.02¾	.03¾
Sal Soda, bbls, wks ...100 lb.	...	1.15	...	1.15	1.15	1.30
Salt Cake, 94-96%, c-l, wks ton	19.00	23.00	19.00	23.00	19.00	23.00
Chrome, c-l, wks ......ton	11.00	12.00	11.00	12.00	11.00	13.00
Saltpetre, gran, 450-500 lb bbls ....lb.	.06	.064	.06	.064	.059	.06¼
Cryst, bbls ....lb.	.07	.074	.07	.074	.069	.08
Powd, bbls ....lb.	.07	.074	.07	.074	.069	.07⅞
Satin, White, 550 lb bbls..lb.	...	.01½	...	.01½	...	.01½
Schaeffer's Salt, kgs ......lb.	.46	.48	.46	.48	.46	.50
Shellac, Bone dry, bbls..lb. r	.17½	.18	.17½	.22	.17½	.26½
Garnet, bgs ....lb.	.15	.16	.15	.17	.16	.20
Superfine, bgs ....lb. s	.13½	.14	.13½	.18½	.14½	.18½
T. N., bgs ....lb. s	.12½	.13	.12½	.14½	.13½	.16
Silver Nitrate, vials .....oz.	.32⅞	.34⅞	.32⅝	.35½	.32 5/16	.34⅞
Slate Flour, bgs, wks ....ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks ....100 lb.	...	1.25	...	1.25	...	1.25
58% light, bgs .....100 lb.	...	1.23	...	1.23	...	1.23
blk ....100 lb.	...	1.05	...	1.05	...	1.05
paper bgs ....100 lb.	...	1.20	...	1.20	...	1.20
bbls ....100 lb.	...	1.50	...	1.50	...	1.50
Caustic, 76% grnd & flake, drs ....100 lb.	...	3.00	...	3.00	...	3.00
76% solid, drs .....100 lb.	...	2.60	...	2.60	...	2.60
Liquid sellers, tks ..100 lb.	...	2.25	...	2.25	...	2.25
Sodium Abietate, drs .....lb.	...	.13	.08	.13	...	.08
Acetate, tech, 450 lb bbls, wks ....lb.	.04¼	.05	.04¼	.05	.04½	.05
Alignate, drs ....lb.	...	.69	.64	.69	...	.64
Antimoniate, bbls ......lb.	.15¾	.16¼	.13¾	.16¼	.12	.14
Arsenate, drs ....lb.	.08	.08½	.08	.11½	...	.10½
Arsenite, liq, drs .....gal.	.30	.33	.33	.40	.40	.75
Benzoate, USP, kgs ....lb.	.46	.48	.46	.48	.46	.48
Bicarb, 400 lb bbl, wks 100 lb.	...	1.75	...	1.75	1.75	1.85
Bichromate, 500 lb cks, wks* ....lb.	.06½	.07	.06½	.07	.06½	.07
Bisulfite, 500 lb bbl, wks lb.	.03¼	.036	.03¼	.036	.03¼	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	...	...	...	...
Chlorate, bgs, wks .....lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks ......lb.	.16½	.17½	.15½	.17½	.15½	.17½
Fluoride, 90%, 300 lb bbls, wks ....lb.	.07½	.08¼	.07½	.08¼	.07¼	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks ....lb.	.16	.17	.16	.17	.17	.19
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	2.50	3.00	2.50	3.00	2.50	3.00
Tech, reg cryst, 375 lb bbls, wks ......100 lb.	2.40	2.75	2.40	2.75	2.40	2.75
Iodide ....lb.	1.90	1.95	1.90	1.95	1.90	2.05
Metal, drs, 280 lbs .....lb.	...	.19	...	.19	...	...
Metanilate, 150 lb bbls..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks ....100 lb.	...	2.15	...	2.15	2.15	3.00
cryst, bbls, c-l, wks 100 lb.	...	2.75	...	2.75	2.75	3.25
Monohydrate, bbls .....lb.	...	.023	...	.023	...	.023
Naphthenate, drs ....lb.	.12	.19	.09	.19	...	.09
Naphthionate, 300 lb bbl lb.	.52	.54	.52	.54	.52	.54
Nitrate, 92%, crude, 200 lb bgs, c-l, NY ....ton	...	27.80	26.80	27.80	24.80	26.80
100 lb bgs ....ton	...	28.50	27.50	28.50	25.50	27.50
Bulk ....ton	...	26.50	25.50	26.50	23.50	25.50

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 3c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ½c higher.

Current

Sodium Nitrite
Terpineol

	Current Market		1937 Low	1937 High	1936 Low	1936 High
Sodium (continued):						
Nitrite, 500 lb bbls .....lb.	.07	.10	.07	.10	.07	.08
Orthochlorotoluene, sulfonate, 175 lb bbls, wks..lb.	.25	.27	.25	.27	.25	.27
Perborate, drs, 400 lbs..lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.18
Peroxide, bbls, 400 lb...lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	1.90	...	1.90	1.95	2.30
bgs, wks ....100 lb.	...	1.70	...	1.70	1.75	2.10
Tri-sodium, tech, 325 lb bbls, wks ....100 lb.	...	2.05	...	2.05	1.95	2.30
bgs, wks ....100 lb.	...	1.85	...	1.85	1.75	2.10
Picramate, 160 lb kgs ...lb.	.65	.67	.65	.67	.65	.69
Prussiate, Yellow, 350 lb bbl, wks ....lb.	.10	.11½	.10	.11½	.10	.12
Pyrophosphate, anhyd, 100 lb bbls ....lb.	...	.10	...	.10	.10	.132
Sesquisilicate, drs, c-l, wks ....100 lbs.	...	3.00	...	...	...	...
Silicate, 60°, 55 gal drs, wks ....100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°, 35 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks ....100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY ....lb.	.05¾	.06½	.05¾	.07	.05¼	.07¼
Stannate, 100 lb drs ....lb.	.37	.40	.33	.44	.28½	.37½
Stearate, bbls ....lb.	.19	.20	.19	.20	.20	.26
Sulfanilate, 400 lb bbls..lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks ....100 lb. †	1.45	1.90	1.45	1.90	1.30	1.90
Sulfide, 80% cryst, 440 lb bbls, wks ....lb.	...	.02¼	...	.02¼	...	.02¼
62% solid, 650 lb drs, c-l, wks ....lb.	...	.02	...	.02	...	.03
Sulfite, cryst, 400 lb bbls, wks ....lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs ......lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls ...lb.	...	.12	...	.12	...	...
Tungstate, tech, crys, kgs lb.	...	nom.	.85	.90	.85	.90
Sorbitol, com., drs, basis content, wks ....lb.	...	.25	...	.25	...	...
Spruce Extract, ord, tks...lb.	...	.01	...	.01	...	.01
Ordinary, bbls ....lb.	...	.01½	...	.01½	...	.01½
Super spruce ext, tks...lb.	...	.01⅝	...	.01⅝	...	.01⅝
Super spruce ext, bbls ..lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs ....lb.	...	.04¼	.04	.04¼	...	.04
Starch, Pearl, 140 lb bgs 100 lb.	4.33	4.53	3.78	4.53	2.99	4.30
Powd, 140 lb bgs ...100 lb.	4.43	4.63	3.88	4.63	3.90	4.54
Potato, 200 lb bgs .....lb.	...	.05½	.04½	.05½	.04½	.05½
Imp, bgs ....lb.	.05½	.06	.05	.06	.05	.06
Rice, 200 lb bbls ......lb.	...	.07¼	...	.07¼	...	.07¼
Wheat, thick, bgs ......lb.	.07	.08½	.07	.08½	.08¼	.08½
Strontium carbonate, 600 lb bbls, wks ....lb.	.07¼	.07½	.07¼	.07½	.07¼	.07½
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¾	.07¾	.08¾	.08¾	.09½
Sucrose octa-acetate, den, grd, bbls, wks ....lb.	.45	...	.45	...	.45	...
tech, bbls, wks ....lb.	.40	...	.40	...	.40	...
Sulfur, crude, f.o.b. mines. ton	18.00	19.00	18.00	19.00	18.00	19.00
Flour, coml, bgs ....100 lb.	1.65	2.35	1.65	2.35	1.60	2.35
bbls ....100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs ..100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls ....100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs .....100 lb.	2.85	3.00	2.85	3.00	2.40	3.00
Superfine, bgs ......100 lb.	2.65	2.80	2.65	2.80	2.20	2.80
bbls ....100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs ....100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls ....100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs ....100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls ....100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks ....lb.	.03	.04	.02½	.04	...	...
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.06½	.08½
Multiple units, wks ....lb.	.04½	.07	.04½	.07	.05½	.06
tks, wks ....lb.	.04	.05	.04	.05	.04½	.04¾
Refrigeration, cyl, wks ..lb.	.16	.17	.15	.17	.10	.13
Multiple units, wks ....lb.	.07½	.10	.07½	.10	.07	.09¼
Sulfuryl Chloride ....lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd ......ton	...	59.00	59.00	65.00	52.00	60.00
Extract, 42°, bbls .....lb.	.05¼	.06¼	.05¼	.06¼	...	...
Superphosphate, 16% bulk, wks ....ton	...	8.50	8.25	8.50	...	...
Run of pile ....ton	...	8.00	...	8.00	...	...
Triple, 44-45%, a. p. a. bulk, wks, Balt. unit ......ton	...	.70	...	.70	...	...
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	18.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	22.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	75.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	80.00
Tankage Grd, NY .....unit *u*	...	3.50	3.50	4.40	2.65	4.25
Ungrd ....unit *u*	...	3.50	3.50	4.35	2.40	4.25
Fert grade, f.o.b. Chgo unit *u*	...	3.25	3.25	4.00	2.40	4.00
South American cif ..unit *u*	...	3.80	3.80	4.25	2.70	3.90
Tapioca Flour, high grade, bgs ....lb.	.03¼	.05½	.03¼	.05½	.03½	.05½
Tar Acid Oil, 15%, drs ..gal.	.22½	.25½	.21	.25½	.21	.24
25%, drs ....gal.	.26½	.29½	.24½	.29½	.24	.27½
Tar, pine, delv, drs .....gal.	...	.26	...	.26	.25	.26
tks, delv, E. cities ....gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls..lb.	.26¾	.27	.24¾	.27	.24¾	.25
USP, bbls ....lb.	.32	.32½	.30	.32½	.28	.30½
Terpineol, den grd, drs ...lb.	.13¾	.14¾	.13¾	.14¾	.13¾	.14¾
tks ....lb.	.13	.14	.13	.14	.13	.14

† Bags 15c lower; *u* + 10; * Bbls. are 20c higher.

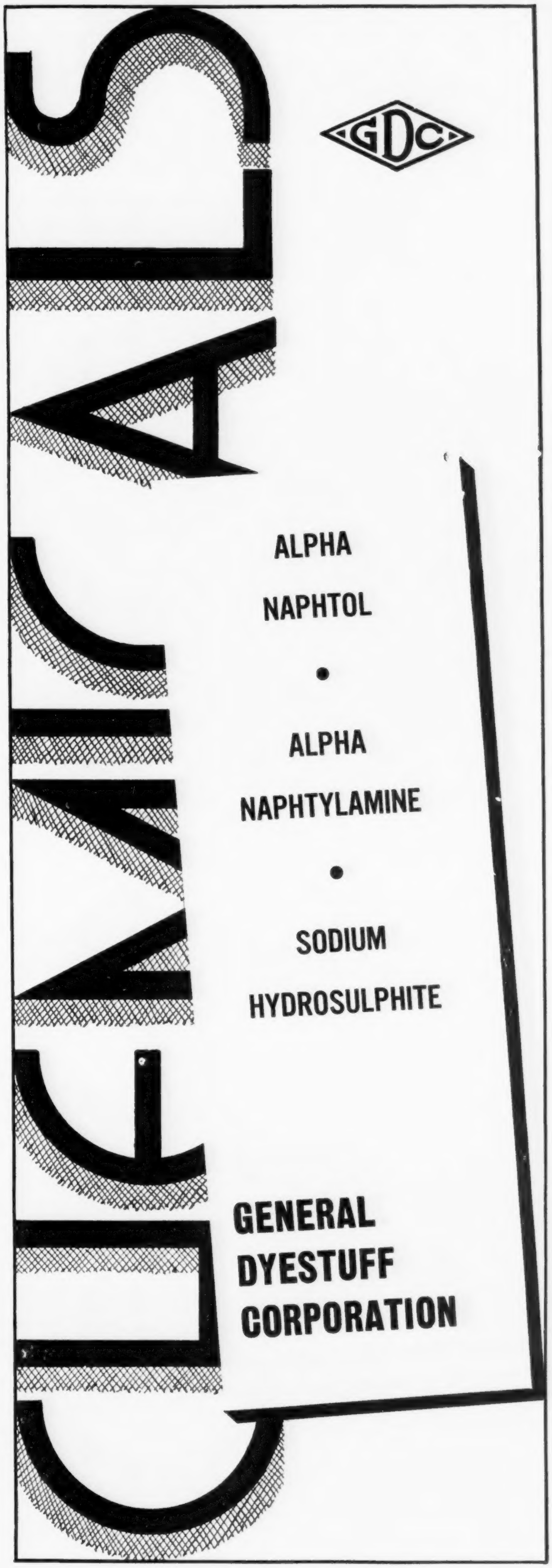
	Current Market		1937 Low	1937 High	1936 Low	1936 High
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech lb.	...	.10½	...	.10½	...	...
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbl lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks lb.	.41½	.42	.37½	.46	.35	.39½
Metal, NY lb.	...	.57⅝	.49⅞	.66	.40½	.52½
Oxide, 300 lb bbls, wks lb.	.58	.60	.55	.59	.47	.57
Tetrachloride, 100 lb drs, wks lb.	...	.29¼	.25½	.32	.21¼	.26¾
Titanium Dioxide, 300 lb bbls lb.	.16¼	.17	.16¼	.17	.16¼	.19¼
Barium Pigment, bbls lb.	.06⅛	.06⅜	.06	.06⅜	.05¾	.06½
Calcium Pigment, bbls lb.	.06⅛	.06⅜	.06	.06⅜	.05¾	.06½
Toluidine, mixed, 900 lb drs, wks lb.	.26	.27	.26	.27	.27	.28
Toluol, 110 gal drs, wks gal.	...	.35	...	.35	...	.35
8000 gal tks, frt allowed gal.	...	.30	.	.30	...	.30
Toner Lithol, red, bbls lb.	.75	.80	.75	.80	.75	.80
Para, red, bbls lb.	...	.75	...	.75	...	.75
Toluidine, bgs lb.	...	1.35	...	1.35	.	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	.32	.36
Triamyl Borate, lcl, drs, wks lb.	.	.27	.	.27	...	
Triamylamine, c-l, drs, wks lb.	.77	1.25	.77	1.25	...	1.25
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	...
Tributyl Phosphate, frt all'd lb.	...	.50	...	.50	...	...
Trichlorethylene, 600 lb drs, frt allowed E. Rocky Mts lb.	.089	.094	.089	.094	.089	.094
Tricresyl phosphate, tech, drs lb.	...	.26½	.22½	.26½	.19	.26
Triethanolamine, 50 gal drs wks lb.	.21	.22	.21	.30	.26	.30
tks, wks lb.	...	.20	.20	.25	. .	.25
Triethylene glycol, drs, wks lb.	...	.26	...	...	...	...
Trihydroxyethylamine Oleate, bbls lb.	...	.30	...	...	...	...
Stearate, bbls lb.	...	.30	...	...	...	...
Trimethylamine, c-l, drs, frt allowed E. Mississippi lb.	...	1.00	...	1.00	...	...
Triphenylguanidine lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs lb.	.34	.36	...	...	...	...
Tripoli, airfloated, bgs, wks ton	25.00	30.00	25.00	30.00	27.50	30.00
Turpentine (Spirits), c-l, NY dock, bbls gal.	...	.39	.39	.47	.40½	.50
Savannah, bbls gal.	...	.34	.34	.42	.35½	.45
Jacksonville, bbls gal.	...	.34½	.34½	.41	.35¼	.44½
Wood Steam dist, bbls, c-l, NY gal.	.36	.38	.36	.44	.38	.47
Urea, pure, 112 lb cases lb.	.14½	.15½	.14½	.15½	.14½	.17
Fert grade, bgs, c.i.f. ton						
c.i.f. S.A. points ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom, f.o.b., wks ton	95.00	101.00	95.00	101.00	95.00	110.00
Urea Ammonia liq 55% NH_3, tks unit	...	1.00	1.00	1.04	...	.96
Valonia beard, 42%, tannin bgs ton	..	47.00	35.00	49.00	46.00	64.50
Cups, 32% tannin, bgs ton	31.75	33.25	31.50	36.00	34.00	42.00
Vanilin, ex eugenol, 25 lb tins, 2000 lb lots lb.	...	3.65	...	3.65	3.65	3.75
Ex-guaiacol lb.	...	3.55	...	3.55	3.55	3.65
Vermillion, English, kgs lb.	1.80	1.90	1.72	1.90	1.52	1.85
Wattle Bark, bgs ton	.	36.50	31.00	36.50	26.50	32.00
Extract, 60°, tks, bbls lb.	.04⅜	.04½	.03⅝	.04½	...	.03⅝
WAXES						
Wax, Bayberry, bgs lb.	.17	.17½	.16½	.17½	.16½	.20
Bees, bleached, white 500 lb slabs, cases lb.	.39	.45	.38	.45	.34	.40
Yellow, African, bgs lb.	.29½	.30	.28½	.30	.24	.27
Brazilian, bgs lb.	.32	.34	.33	.34	.25	.29½
Chilean, bgs lb.	.32	.34	.30	.34	.25	.29½
Refined, 500 lb slabs, cases lb.	.35	.39	.29½	.39	.28	.32
Candelilla, bgs lb.	.14	.15	.14	.16½	.14	.17½
Carnauba, No. 1, yellow, bgs lb.	.47½	.49½	.45	.49	.43½	.48
No. 2, yellow, bgs lb.	.46	.46	.43½	.46½	.42	.46
No. 2, N. C., bgs lb.	.40	.40½	.38	.43	.38	.40
No. 3, Chalky, bgs lb.	.36½	.37	.34½	.39	.33½	.38
No. 3, N. C., bgs lb.	.37	.38½	.35	.37¾	.34	.41
Ceresin, dom, bgs lb.	.08½	.12	.08	.12	.08	.11
Japan, 224 lb cases lb.	.09½	.10	.09½	.11	.08	.10½
Montan, crude, bgs lb.	.11	.12	.11	.12	.10¼	.11¼
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.23	.24	.23	.24	.22	.24
Cakes, cases lb.	.24	.25	.24	.25	.23	.25
Whiting, chalk, com, 200 lb bgs c-l, wks ton	12.00	14.00	12.00	14.00	...	15.00
Gilders, bgs, c-l, wks ton	..	15.00	...	15.00	11.50	15.00
Wood Flour, c-l, bgs ton	20.00	30.00	18.00	30.00	18.00	30.00
Xylol, frt allowed, East 10° tks, wks gal.	...	.33	...	.33	...	.33
Coml, tks, wks, frt all'd gal.	...	.30	...	.30	...	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.36	.37
Zinc, Carbonate tech, bbls, NY lb.	.14	.15	.12	.15	.09	.11
Chloride fused, 600 lb drs, wks lb.	.04½	.046	.04½	.046	.04½	.05¾
Gran, 500 lb drs, wks lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb.	...	2.25	2.00	2.25	...	2.00
Cyanide, 100 lb drs lb.	.36	.38	.36	.38	.36	.38
Zinc Dust, 500 lb bbls, c-l, delv lb.	...	.0865	.079	.094	.068	.0755
Metal, high grade slabs, c-l, NY 100 lb.	...	7.10	6.35	7.85	...	5.825
E. St. Louis 100 lb.	...	6.75	6.00	7.50	4.80	5.45
Oxide, Amer, bgs, wks lb.	.06¼	.06½	.05¼	.06½	.05	.05½
French, 300 lb bbls, wks lb.	.06¼	.07½	.05½	.07½	.05½	.07
Palmitate, bbls lb.	.23	.25	.23	.25	.22	.23
Resinate, fused, pale, bbls lb.	...	.10	.09	.10	.05¾	.10
Stearate, 50 lb bbls lb.	.20	.23	.20	.23	.19	.23

		Current Market		1937 Low	1937 High	1936 Low	1936 High
Zinc Sulfate, crys, 400 lb bbl, wks	lb.	...	.033	.028	.033	.028	.033
Flake, bbls	lb.	...	.0375	.032	.0375	.032	.035
Sulfide, 500 lb bbls, delv	lb.	.09¼	.09¾	.09¼	.09¾	.09¼	.11¾
bgs, delv	lb.	.09	.09½	.09	.09½	.09	.11½
Sulfocarbolate, 100 lb kgs	lb.	.24	.26	.24	.26	.24	.25
Zirconium Oxide, crude, 73-75% grd, bbls, wks	ton	75.00	100.00	...	...	...	...
kgs, wks	lb.	.04¼	.04½	...	...	...	...

Oils and Fats

		Current Market		1937 Low	1937 High	1936 Low	1936 High
Babassu, tks, futures	lb.	...	.08½	.08½	.11¼	...	...
Castor, No. 3, 400 lb bbls	lb.	.10¼	.10¾	.10¼	.10¾	.10¼	.10¾
Blown, 400 lb bbls	lb.	.12¼	.13	.12¼	.13	.12¼	.13
China Wood, drs, spot NY	lb.	.12½	.12¾	.12½	.14¾	.13	.19¼
Tks, spot NY	lb.	.118	.12	.118	.148	.125	.19
Coast, tks	lb.	...	nom.	.133	.146	.127	.18
Coconut, edible, bbls NY	lb.	...	.11	.11	.15	.09¼	.14¼
Manila, tks, NY	lb.	...	.05¼	.05¼	.09½	.04⅛	.07
Tks, Pacific Coast	lb.	...	.05	.05	.08⅞	.03⅞	.08½
Cod, Newfoundland, 50 gal bbls	gal.	.52	nom.	.51	.52	.40	.48½
Copra, bgs, NY	lb.	.032	nom.	.032	.055	.0320	.0535
Corn, crude, tks, mills	lb.	.08¼	.08½	.08¼	.10¾	.08	.10½
Refd, 375 lb bbls, NY	lb.	.11	.11¼	.11	.13¼	.10¾	.13
Degras, American, 50 gal bbls. NY	lb.	...	.08¼	.07¾	.08¼	.05¼	.08
English, bbls, NY	lb.	...	.08¼	.07¾	.08¼	.04	.08
Greases, Yellow	lb.	.07⅞	.08⅛	.07⅞	.09	.03⅜	.08¼
White, choice bbls, NY	lb.	.08¼	.09¾	.08¼	.10¼	.04⅛	.08¾
Herring, Coast, tks	gal.	...	nom.	...	nom.	...	.31
Lard Oil, edible, prime	lb.	...	.14¾	.14¾	.16¾	.12¾	.16¼
Extra, bbls	lb.	...	.13	.13	.13½	.09½	.13
Extra, No. 1, bbls	lb.	...	.12½	.12½	.13½	.07¾	.12¼
Linseed, Raw less than 5 bbl lots	lb.	...	.118	.107	.121	.104	.117
bbls, c-l, spot	lb.	...	.11	.099	.113	.096	.103
Tks	lb.	...	.104	.093	.107	.086	.097
Menhaden, tks, Baltimore	gal.	...	.40	.37	.45	.25	.36
Refined, alkali, drs	lb.	...	.098	.09	.10	.066	.084
Tks	lb.	...	.088	.084	.09	.062	.078
Kettle bodied, drs	lb.	...	.108	.10	.11	.08	.096
Light pressed, drs	lb.	...	.092	.084	.094	.06	.078
Tks	lb.	...	.082	.078	.084	.056	.072
Neatsfoot, CT, 20°, bbls, NY	lb.	...	.18¼	.17½	.18¼	.16	.17
Extra, bbls, NY	lb.	...	.12¾	.12¾	.13¾	.08	.12½
Pure, bbls, NY	lb.	...	.13½	.13½	.14¼	.11½	.12¾
Oiticica, bbls	lb.	.10⅞	.11	.10⅞	.12	.10	.15½
Oleo, No. 1, bbls, NY	lb.	...	.13	.12⅜	.14½	.09¼	.14
No. 2, bbls, NY	lb.	...	.13½	.11⅞	.14	.08¾	.13½
Olive, denat, bbls, NY	gal.	1.50	nom.	1.50	1.65	.73	1.60
Edible, bbls, NY	gal.	2.40	nom.	2.20	2.50	1.60	2.25
Foots, bbls, NY	lb.	.11¼	nom.	.11¼	.12½	.08	.10⅜
Palm, Kernel, bulk	lb.	...	.05¾	.05¾	.08⅛	.04¾	.083
Niger, cks	lb.	...	.06	.05⅝	.07¼	.04	.06½
Sumatra, tks	lb.	...	.05	.05	.06½	.03¾	.06½
Peanut, crude, bbls, NY	lb.	.08½	nom.	.08½	.10⅝	.08	.10½
Tks, f.o.b. mill	lb.	.08¼	nom.	.08¼	.10¼	.17¾	.10⅜
Refined, bbls, NY	lb.	.12¼	nom.	.12¼	.13½	.12	.13¼
Perilla, drs, NY	lb.	.11	.11¼	.11	.12	.07	.11¾
Tks, Coast	lb.	.105	.107	.105	.11½	.066	.11¼
Pine, see Pine Oil, Chemical Section.							
Rapeseed, blown, bbls, NY	lb.	.14	.14¼	.13	.14¼	.086	.13½
Denatured, drs, NY	gal.	...	.95	.85	.95	.52	.85
Red, Distilled, bbls	lb.	.11⅝	.12⅝	.11⅝	.12⅝	.08⅝	.11⅝
Tks	lb.	...	.10¾	...	.10¾	.07¾	.09¾
Salmon, Coast, 8000 gal tks	gal.	...	nom.	...	nom.	.31	.32½
Sardine, Pac Coast, tks	gal.	...	.52	.50	.55	.28	.47
Refined alkali, drs	lb.	...	.098	.09	.10	.066	.084
Tks	lb.	...	.088	.084	.09	.062	.078
Light pressed, drs	lb.	...	.092	.084	.094	.06	.078
Tks	lb.	...	.082	.078	.084	.056	.072
Sesame, yellow, dom	lb.	.11½	nom.	.11½	.13¼	.12¾	.14½
White, dos	lb.	.11½	nom.	.11½	.13¼	.12¾	.14½
Soy Bean, crude							
Dom, tks, f.o.b. mills	lb.	.09½	nom.	.09½	.10½	.07	.10½
Crude, drs, NY	lb.	.101	.105	.101	.11½	.076	.11½
Ref'd, drs, NY	lb.	.111	.11½	.111	.12½	.081	.12½
Tks	lb.	.10½	.109	.10½	.11½	.07½	.11½
Sperm, 38° CT, bleached, bbls NY	lb.	.10	.102	.10	.102	.094	.102
45° CT, bleached, bbls, NY	lb.	.093	.095	.093	.095	.087	.095
Stearic Acid, double pressed dist bgs	lb.	.12½	.13½	.12½	.13½	.08½	.12½
Double pressed saponified bgs	lb.	.12¾	.13¾	.12¾	.13¾	.09	.12¾
Triple pressed dist bgs	lb.	.15½	.16½	.15½	.16½	.11¼	.15½
Stearine, Oleo, bbls	lb.	.09½	.09¾	.09	.11½	.07¼	.12¼
Tallow City, extra loose	lb.	...	.08⅛	.08⅛	.09¼	.04⅛	.08⅜
Edible, tierces	lb.	...	.08¾	.08½	.10¼	.06¾	.09½
Acidless, tks, NY	lb.	...	.12	.12	.13	.07	.11¾
Turkey Red, single, bbls	lb.	.08	.08½	.08	.08½	.08	.08½
Double, bbls	lb.	.12½	.13	.12½	.13	.12½	.13½
Whale:							
Winter bleach, bbls, NY	lb.	.109	.111	.091	.111	.072	.087
Refined, net, bbls, NY	lb.	.105	.107	.087	.107	.068	.083

Index to Advertisers



"We"—Editorially Speaking

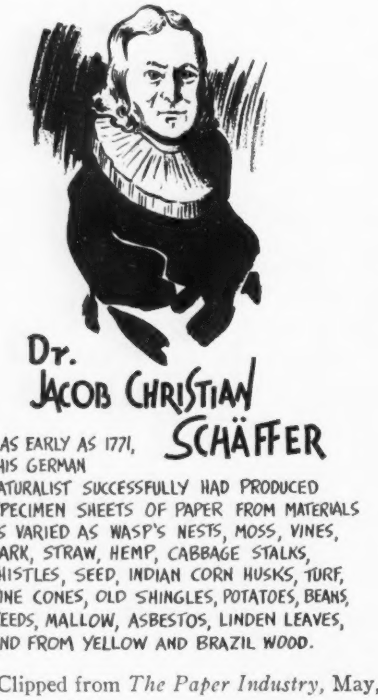
From our cherished contemporary "The Bawl Street Journal" we learn that Charles E. Adams, has added Mrs. Margaret Sanger to the directorate of the Air Reduction Company.

Dr. William M. Grosvenor came into court the other morning, a portly brief-case strapped over his right shoulder and a stack of books tucked under his left arm. Following him was son, Bill, Jr., toting two microscope cases. "Hah!" whispered the Clerk to the Sergeant-at-arms, "here comes the Fuller Brush man."

Billy Hale's great "Celloveil" idea of covering the fruit trees with sheets of transparent cellulose acetate has run amuck for reformers who have been cleaning up New York burlesque shows. They formally charge him with putting on a strip tease act in the orchard.

Personally "We" do not feel that this is nearly so valid an accusation as that of the insects who might very properly institute a boycott under the slogan, "Hale is unfair to butterflies."

Which reminds us too, that we have been utterly unable to confirm the rumor that, prompted by the move of headquarters to Barberton, Ohio, the workers at the nearby Painesville alkali works walked out and are parading the streets carrying placards declaring: "Columbia is unfair to Diamond."



Clipped from *The Paper Industry,* May, 1937, p. 203.

Speaking of taxes, as who isn't, the National Life Insurance Co. has figured out that the "invisible taxes" in food prices average 7.1 per cent.; in clothing, 8 per cent.; in fuel and light, 9.5 per cent., and in rent, 25.3 per cent.

Merrimac Chemical Co. has gone about it another way and on the basis of the good old fashioned system of "working the taxes out on the roads" has discovered that at today's rates each and every one of their employees, to pay their own personal taxes, would have donated about two months' labor. Over and above this, the company's direct taxes total $420 per employee.

Aaron E. Carpenter, who as "near-editor" of his firm's house organ, *"The Houghton Line,"* is one of our most cherished contemporaries, flashes another beam of fright on this problem of taxes when he writes in his lively little magazine:

"The other day I decided to see just why we needed so much clerical help for the calculation of taxes which formerly took only a comparatively small part of our Assistant Treasurer's time. I found to my amazement that we are now compelled to calculate and make a return of tax as follows:

U. S. Corporation Income Tax.
U. S. Capital Stock Tax.
U. S. Excess Profits Tax.
U. S. Surtax on Undistributed Profits.
Social Security Tax.
Excise Tax on Lubricating Oils.
Processing Tax on Vegetable Oils.
Penn. Corporate Net Income Tax.
Penn. Capital Stock Tax.
Penn. Corporate Loans Tax.

"In addition we have to pay either an income tax, or a franchise tax and personal property tax in each of the following States in which we are doing business:

California
Colorado
Illinois
Louisiana
Massachusetts
Michigan
Missouri
New York
North Carolina
Ohio
Tennessee
Texas
Washington

Fifteen Years Ago

From our issues of July, 1922

Dr. B. T. Brooks, Mathieson Alkali, returns from trip to England and the Continent; reports business booming.

Ernest T. Trigg, president, N. P. O. & V. Ass'n advocates standardization of paints and paint packages.

American Agricultural Chemical plans new fertilizer plant in Columbia, Tenn.

Walker Chemical and Selden Co., of Pittsburgh, consolidate under name Selden Co.

Ernest Bischoff, Ernest Bischoff, Inc., sails for Europe.

News item: Business Retarded by Strikes.

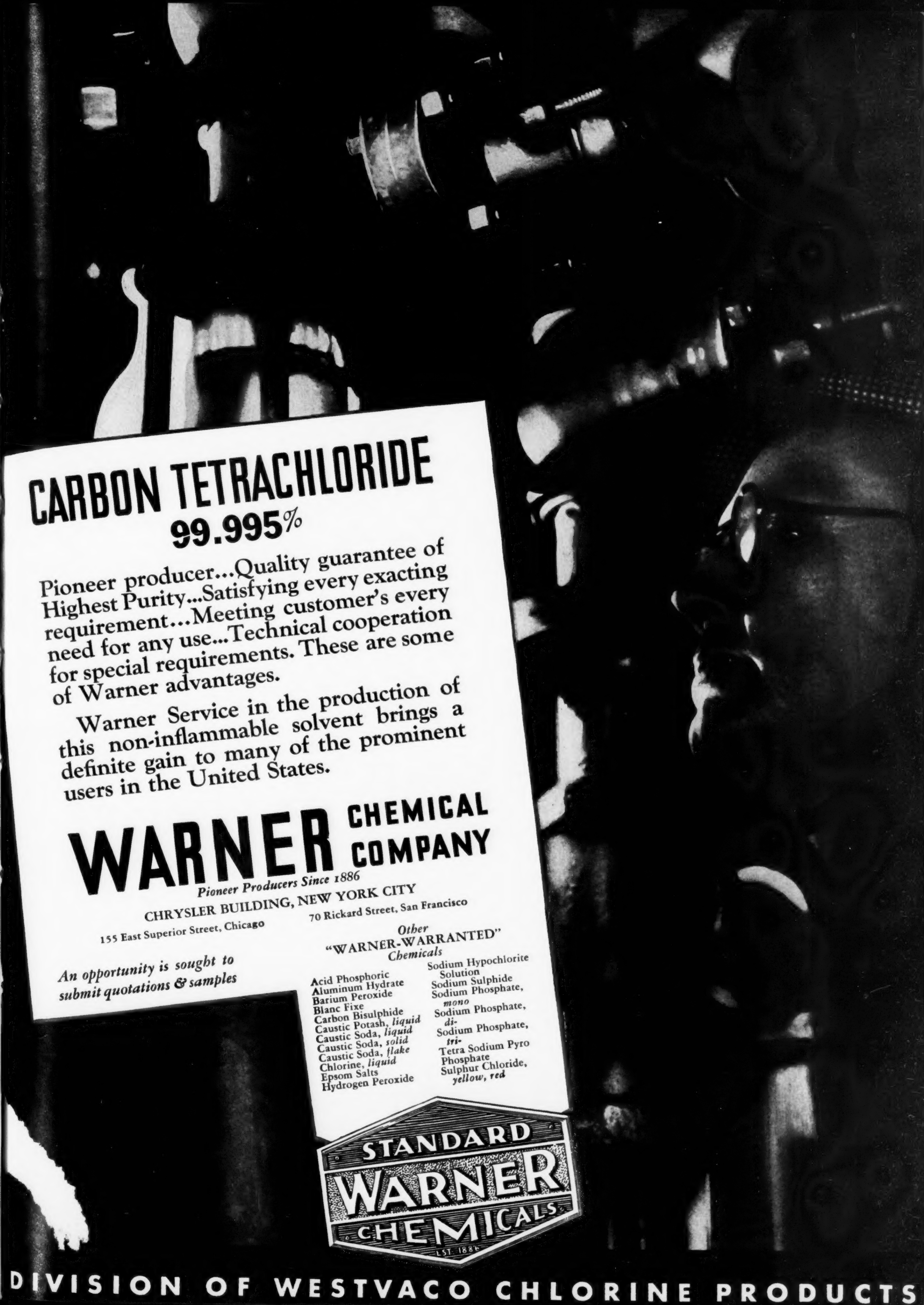
Plant of Raritan Aniline Works closed by receiver.

Eagle Picher Lead, St. Louis, strikes oil in quantity on property near Henryetta, Okla.

"This does not include sales taxes in the various States, most of which are taken care of by our branch offices, though some are kept here. Many of these taxes are exceedingly complicated, particularly where one is deductible from the other.

"Ninety per cent. of our Assistant Treasurer's time is now devoted to tax work, and we have three clerks who spend practically all their time on tax figures. In addition it takes the whole time of two clerks in the Cashier's Department and 75 per cent. of the Cashier's time to figure the Social Security Tax. We also have a clerk in the Sales Department, most of whose time is spent in computing the Excise Tax on lubricating oils. In addition our accountants now spend several days assisting our Assistant Treasurer with our Federal Income Tax and the Pennsylvania Corporate Net Income Tax and checking the figures."

As a natural follow-up to these thoughts on taxes: it is sort of interesting to note that the U. S. Senate investigation of the munitions industry cost our tax-payers $190,000. The Committee by the majority vote of one endorsed the idea of the nationalization of arms and ammunition manufacture. In England, a Royal Commission investigating the same subject cost the tax-payers $35,000 and unanimously voted against nationalization.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Caustic Soda, solid
Caustic Soda, flake
Chlorine, liquid
Epsom Salts
Hydrogen Peroxide
Sodium Hypochlorite Solution
Sodium Sulphide
Sodium Phosphate, mono
Sodium Phosphate, di-
Sodium Phosphate, tri-
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